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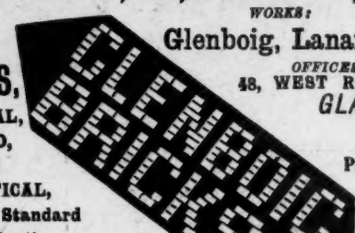

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EDITORIAL NOTES.

A Voice from South Wales.

IT is impossible, in Presidential Addresses to the members of gas organizations, to escape from discussing the effects—present and prospective—of the war upon the industry. It is perhaps the most profitable topic of the day; inasmuch as, though it is impossible to ward off the effects, it may be possible, by combined consideration and discussion, to do something towards minimizing the weight and probably the duration of some of them. We have recently had presidential views from Ireland and Scotland on topics that currently affect the industry; and now we can add views from Wales—the mouthpiece on this occasion being Mr. J. E. Kenshole, of Merthyr Tydfil, and the channel of communication his Presidential Address to the Wales and Monmouthshire Institution of Gas Engineers. In it, some very important subjects, as well as questions of less importance, had the touch of local experience given to them; and one of the less important was the reference to public lighting restrictions. While admitting that everything possible should be done for the safety of life and property in connection with air raids, Mr. Kenshole is of opinion that, so far as Wales is concerned, the stringent restrictions imposed in regard to public lighting are not only unnecessary, but are a positive danger. Local circumstances differ. But this is a subject that can be examined relatively. No worse place than London can be found in respect of dangerous street traffic after dark; and yet to-day the public lighting restrictions are diametrically opposed to public safety so far as street traffic is concerned, assuming that it was after dusk of the same intensity as prior to the war. London has been a favourite goal for the cowardly German murderers, who come under the cover of darkness, and who prefer the safety of height. Possibly Wales is beyond the danger zone so far as Zeppelins are concerned. But what has been the experience in London? If after dusk street traffic had continued on the pre-war scale, with lighting reduced to a degree that enshrouds the streets in gloom, the danger would have been considerably magnified. But it is a fact that, since the reduction of street lighting, gradually through various causes—men, petrol, smaller public demand—the denseness of the traffic in London streets has after nightfall been largely diminished, and with it the risk to pedestrians. Traffic conditions have composed themselves to lighting conditions, partly through the causes named, and partly through more being pressed into the day than formerly. The habit was growing before the war of pushing things later into the day; but the war has helped to put a stop to that, and steps have had to be retraced, which is proving an advantageous reformation to all but dealers in lighting agents.

Hopes and fears are to be found in juxtaposition in the address as to the supply of coal in the coming winter. This is a matter of considerable anxiety for all who have not been fortunate during the long days in laying in a good stock. But at the moment it is interesting to have Mr. Kenshole's opinion regarding the increase, in favour of the South Wales coalowners, to 6s. 6d. of the 4s. standard excess price per ton of coal. He places this concession among the causes of deep-rooted dissatisfaction; and for this the Board of Trade are responsible. Local observers know the actual conditions better than those at a distance; and, as one of these local observers, Mr. Kenshole confirms the judgment of disinterested persons further afield. He says: "Taking into consideration the enormous profits made, and the very handsome dividends paid by the colliery companies in South Wales and Monmouthshire, I venture to say that it was a grave mistake for the Board of Trade to have increased the price limitation from 4s. to 6s. 6d." This advance is a serious business for large buyers of coal in and from the South Wales area; and it is rendered more serious by the crafty manipulations of business which compel purchasers by contract to buy part of their requirements in the open market (where they can satisfy them at a price), by which strategy the spirit of the Price of Coal (Limitation) Act is infringed, while the letter of it is not violated, but the profit of the colliery owners is increased. The hardness of this (combined with the heavy income-tax) upon sliding-scale gas companies was illustrated in the presidential utterances by the case of a concern in which the investors are to-day receiving less than 3 per cent. for their money—that is to say, income has been much reduced while obligations have been much advanced. Compare this with the position of the colliery and other non-statutory businesses, the proprietors in which are receiving during the war high dividends after paying the Chancellor of the Exchequer 50 or 60 per cent. of excess profits. In one way during this time of war, the privileges of gas undertakings are not helping them much on account of the restrictions upon them in regard to capital raising and spending, while the statutory control over them, and the liberties of those with whom they trade in raw materials, have heaped upon them during these disruptive years an intolerable amount of injustice in comparison with most other concerns. There are a few undertakings with good standard prices, and fortunate through individual circumstances in their gas prices before the war, that have not felt through reduced dividends the oppressions and curtailments so much as some of their less fortunate fellows.

Residuals in Wales have not helped to relieve the increased financial burdens to the same extent as in some other parts of the kingdom. Coke has been and is in healthy case; but there is cause for complaint in respect of tar. The gas undertakings in the district are unfortunate in having little competition among tar distillers; and, consequently, the prices realized for this commodity, notwithstanding the value extracted to-day (in the case of many undertakings) from the gas and infused into the tar, are not so satisfactory as they might be. Mr. Kenshole might have enlarged on this subject. It seems to us that those with money invested in gas undertakings in South Wales and Monmouthshire might well consider whether, in view of the developments in the home requirements for the derivatives of tar, and for the partially distilled tar for road requirements, now is not an opportune time to relieve the gas undertakings in which they are interested of business connections with outside tar distillers, by forming an independent tar-distilling company of their own, to which they could dispose of their tar on (say) some sliding-scale basis, while the gas shareholders who invest in such separate concern would enjoy a fair profit from what to-day is a business with great expectations attached. Everything possible has to be done to obtain as good a revenue as maybe from gas residuals; for coal and oil are likely to be at high prices for some time, and the future market value of sulphate of ammonia has an obscurity about it which at present cannot be penetrated.

There are other matters of interest in the address. Comment is made upon certain iniquitous proceedings in connection with income-tax allowances and inequalities in the matter of rating. These are questions which are always with us. Probably we shall never feel entirely satisfied in regard to them, whatever may be done; and while principles are applied (or misapplied) stringently in some cases varying to downright laxity or complete evasion in others, there will always be great divergencies in result, whatever the basis of comparison. These are matters that require to be put upon a proper uniform footing, so far as local circumstances will permit; and, until this is done, there will always be ground for complaint, and supply of illustration of incongruity will not fail, as between company and company, and especially as between municipal undertaking and company undertaking—such as is incorporated in the tables given in Mr. Kenshole's address.

What is the Deficiency in the Coal Supply?

A FURTHER report by the Departmental Coal Organization Committee has been issued, signed by Sir Richard A. S. Redmayne and the half-a-dozen other members; and the report shows the results that have issued from the work the Committee have had in hand. Let us say at the commencement that the effects of this work, which have been directed to improving the quantitative supplies of coal, are not, and cannot be, defined by any hard-and-fast figures, seeing that no assessment can be made of the good that has been effected in stopping the drift from a bad to a worse state in regard to supplies.

The report deals with output, recruiting, absenteeism, stop-days and holidays, transport, the supply of pit timber, and the situation that has to be met. Save in respect of the statistics, there is comparatively little in the document that is new. We are attracted by certain remarks made under the heading "The Situation that Has to be Met," which indicate that the Committee are at a loss how to completely make good an asserted "deficiency" in coal supplies. The Government have stopped the recruiting of coalminers, the miners have curtailed their holidays, there has been an abandonment of stop-days, and a more regular attendance at work. Marked improvement in output has resulted. But the Committee find that all the contributions to improvement are insufficient, though avoidable absenteeism is still capable of much greater reduction. It is not to the credit of the miners that, in these critical times, the Committee should be in the regretful position to say this, and to add, in gentle terms, that all possible to secure a reduction is being done by persuasion. By persuasion! Anyone would think that the local Committees who are entrusted with this matter had a lot of refractory children to deal with, instead of men who ought to be willing and glad, without any persuasion, to do their full part as good patriots. However, the Committee are hoping for better results from the campaign against absenteeism. But if this hope is falsified in the result, then it is thought that the situation will have to be reviewed. The pronounced declaration, however, is made that "a considerable improvement in this direction would not make good the deficiency;" and this is followed by the expression of the conviction that, if "the legitimate requirements are to be fully met, economies must be practised in the consumption of coal." There is no objection to this, provided the Committee recognize that in the consumption of coal there are "legitimate requirements."

It is not unfair to ask, What is the "deficiency," expressed in figures, that the Committee can see would require "considerable improvement" to make good? They supply no means of ascertaining this. But the data as to output and export that they themselves furnish do not confirm the existence of the deficiency. It is stated that the export of coal has been reduced to a "dangerously low figure;" and the exports for the three years 1913-15 are quoted apparently in confirmation. The Committee evidently take 1913 as the standard year, which was not a normal one, seeing that the 73,400,168 tons exported is a "record," presumably through the anxiety of buyers abroad to secure as much British coal as possible to put into store in view of the depletion of stocks through the general strike of British miners in the year 1912. In 1914, the exports amounted to 59,039,800 tons, and in 1915 to 43,534,771 tons. However, if the inflated figure of 73,400,168 tons in 1913 be taken, it shows that in 1915 there was, in comparison, a reduction in exports of 29,865,397 tons. Turning to the beginning of the Committee's report, it is seen that in 1913-14 (August to July) the total output of coal was 281,135,000 tons. In 1914-15, the output descended to 250,368,000 tons; but in 1915-16 there was a small recovery by 4,380,000 tons —the output being 254,748,000 tons. Now on the Committee's own figures, it is seen that the reduction of output comparing 1913-14 and 1915-16 was 26,387,000 tons; while the reduction of exports was equal to 29,865,397 tons —showing a difference in favour of home supplies of no less than 3,478,397 tons.

The question may again be asked as to the actual or approximate measure of the deficiency, under present circumstances, to which the Committee refer? It may be said that the home demand has increased owing to the manufacture of munitions. But before this could be accepted as an explanation, it would be necessary to ask whether the considerable transfer of engineering and other establishments from their customary work to munitions production, together with the number of workers now with the Forces, has not largely brought about a counterbalance in the coal demand.

Distribution Efficiency.

IT was a chatty little paper—designed merely to suggest points for discussion—that Mr. H. D. Madden, of Cardiff, read at the Welsh meeting last Wednesday. It dealt with distribution, which is a subject about which something interesting can always be said, in view of the fact that local conditions, inherent and external to the distribution system, so largely dominate practice and vary experience. Welsh engineers have their own peculiarities in local circumstances. Many of them have their districts honeycombed with mining workings; some have areas in which the pipes, passing up hill and down dale, have no pretensions at making a respectable level run; and others, again, have large tracts of made-ground to go through with ashes, chemical refuse, and other substances of an acid nature in its composition that do anything but promote longevity of mains. These are the men who have distribution experiences that at times are almost heartbreaking. But they do not say much about them; and possibly, when away, they do not care to think much about them. When we read (as can be done in the discussion) of such occurrences as one-third and one-fifth of the gas made at a couple of works running to waste owing to inimical subterranean conditions, which keep the manager ever on the alert, and striving to do something to save from this waste, we can fully appreciate the weight of difficulties in making gas concerns pay in comparatively poor districts, and with prices for gas that have to cover such heavy loss. Mr. Madden, in his paper, refers to "maximum efficiency per ton of coal received." It is a useful working standard; and one of the factors in it is the quantity of gas sold per ton of coal carbonized. And the quantity of gas sold per ton of coal carbonized has a very large relation to the condition and the maintenance in good state of the distribution system.

Both the paper and the discussion were directed to the questions of pipe protection, inspection, and practice, with the view of attaining distribution efficiency and economy under the local circumstances. Mr. Madden spoke of gas volume as well as pressure being important in the distribution system. And, of course, where subterranean conditions are unfriendly to soundness, high pressures accelerate the rate of waste, while supplied at a reasonable pressure and in good volume consumers are satisfied. Volume, too, means larger pipes, and larger pipes metal and strength to withstand underground instability, corrosive action, and modern traffic and weights. The larger pipes are more expensive; but they are a good investment under certain conditions. On the question of corrosive action, especially in respect of steel pipes, Mr. Madden spoke of the importance of proper coating, and of the different experiences, according to subsoil characteristics, in respect of the durability of the coating. On this, Mr. F. Shewring made a point when he spoke of his experience when at Droitwich, through the condition of the subsoil owing to the percolations from the brine springs. He gave the sound advice that the question of a suitable pipe coating should be attacked from the chemical standpoint in relation to the character of the soil, in view of the fact that some acids have different effects on the coating solution. What should be sought for is the best solution for the particular properties of the subsoil that carry on a perpetual "offensive" against the integrity of both coating and pipes. In other words, no one pipe-coating formula can be prescribed for all circumstances. Attention to protection against corrosion is economically important, in view of the fact that corrosive action affecting pipe stability means not only expense in renewals but in loss of gas, and liability in unpleasant ways. These considerations apply not only to main pipes but to services, which in some areas are still the source of prolific waste.

High-pressure distribution and boosting naturally had reference in both paper and discussion; and Mr. Madden and Mr. A. E. Davey, of Aberdare, spoke of how the high-pressure distribution systems for lighting are made to answer the auxiliary purpose of feeding through governors into the ordinary mains, for supporting the general supply. This dual service releases the high-pressure lighting from a part of the charges on the high-pressure distribution system; and it relieves the ordinary gas distribution system of the higher pressure which would otherwise be necessary, and which would involve the risk of greater leakage.

Gas Undertakings and Unemployment Insurance.

In our "Correspondence" columns, Mr. Frank Livesey asks a very pertinent question; and it is this, Is it too late for the gas industry to resist the farcical decisions of the Umpire under the unemployment section of the National Insurance Act? The whole thing seems a farce—from the Act itself to the interpretations, about some of the latter of which there appears to be no rhyme or reason, and confusion is becoming worse confounded. Mr. Livesey cannot detect any principle upon which the decisions of the Umpire are based. There he is wrong. He himself points out two—the one is the total exclusion of workmen whom the Act would benefit; and the other the roping-in of men who are not likely to require any benefit, but from whom contributions can be extracted. In stretching the Act to cover men who do not need it, the Umpire, as the instrument of the Government, is operating completely against the fundamental principle of such a piece of legislation, which could be made quite beneficent if properly, and not absurdly, applied. It is a serious question; and almost daily it is becoming more serious still for the gas industry. The case for protest and resistance (if resistance is possible) is cogently stated by Mr. Livesey; and to his letter readers are referred.

"Always in the Rear."

In our "Correspondence" columns to-day, there is a letter from Mr. T. C. Elder regarding the article that appeared under this heading in our editorial columns last week. As organizer of the Mansion House meeting to which reference was then made, and which had for its purpose the stimulating of interest and effort to secure a larger future for the British engineering and chemical industries, Mr. Elder is anxious that our article shall not be construed to mean that the name of the Institution of Gas Engineers was omitted from the list of supporters through neglect or bias in favour of any section of engineering, or that no opportunity was afforded the gas industry to join hands with the other representative Institutions and Associations in this important object. The information we gave in the article in question as to the Sulphate of Ammonia Association and the Society of British Gas Industries completely acquits Mr. Elder from any charge of neglect or bias; and we can quite accept his private assurance that the one object of the promoters of the meeting was to push the cause of the engineering and chemical industries on the broad grounds of national, not selfish, interest. As the gas industry has a large stake in the national interests through the engineering and chemical industries, it would be well for it if its face was seen a little more to the front of movements of this kind. It would have been very welcome on this occasion.

Steam-Raising Experiences with Coke.

An article in other columns, on "Coal Economy in London," by Mr. E. W. Nicol, is something more than its title indicates. It is one of the best statements that the Fuel Expert to the London Coke Sales Committee has yet issued as to the economy that is to be derived from the supplanting of coal by high-temperature coke in steam-raising. The financial advantage of making the change from the smoke-producing to the smokeless fuel has hitherto been the principal component in the argument in favour. But to-day we are all thinking and talking nationally; and Mr. Nicol very properly claims for the work of the London Coke Sales Committee that its benefits are not confined to the gas industry, but are of national consequence. He is right; for besides the direct economy of using coke for steam-raising, given suitable conditions of burning, there is the saving of the carriage of the coal that would otherwise have been used, while gas and residual products have been obtained from the coal which yielded the coke required for steam-raising. The Committee in this matter are up-against the obstinacy that a long-standing custom encourages; but the figures supplied by Mr. Nicol as to the progress made during the war in the work of adapting boilers for coke use are extremely gratifying. And in this connection, our contributor makes a remark which will be appreciated by every gas manager: "Its introduction under present circumstances should relieve any misgivings as to the disposal of high-temperature coke in future, since it gives promise of continued favour at a price which need only be adjusted to current rates of competing fuels in order to secure continued preference." At the end of the article is a table summarizing the results of using coke from the daily boiler reports of one institution of the Metropolitan Asylums Board; and Mr. Nicol suggests that these results indicate "economies which might be promoted by means of a State-imposed rating of steam-boilers on a non-volatile fuel basis." Apart from the lower fuel cost compared with coal at present prices, the figures in the table show the excellent over-all thermal efficiency of approximately 78 per cent., assuming the average calorific value of the coke as sold at 12,000 B.Th.U.; and this thermal efficiency is well above the average realized with coal-fired boilers, as may be seen by an average of a hundred tests included in an article on "The Running of Boiler Plants and National Economy," by Messrs. D. Brownlee and H. Green, published in "Engineering" on April 28 last. The average efficiency for the boilers only was 55·65 per cent.; while for the plant complete, including auxiliary steam, it was no less than 62·03 per cent.

Exodus of Daylight Saving.

We have had our experience of daylight saving this summer; and it came to an end for the year early last Sunday morning. The general view is that daylight saving in summer is not by any means a bad thing. This being so, the change may become normal year by year; and, whatever its effects upon the purveyors of lighting agents, they are more likely to have to be permanently endured. On the whole, gas undertakings have not suffered heavily by the change. Making allowance for the effects of obligatory light reduction, the diminution of gas consumption caused by putting forward the hands of the clock by an hour has not, compared with the corresponding period of 1915, been heavy, and such as it has been has, in the majority of gas undertakings, been more than compensated for by increased consumption in other directions—principally for cooking in residential areas, and cooking and industrial power and heating in manufacturing districts. The electrical concerns in residential areas have not fared so well, and come to that neither have the undertakings in industrial areas, for the reduction has been on the heavy priced lighting units. Now there is a fresh proposal on the part of the Government to issue an order for the earlier closing of shops this winter. This will not make much difference to suppliers of light in contrast with last winter, seeing that the lighting restrictions were then in force, and almost all shopkeepers voluntarily closed earlier, owing to the negligible amount of custom that was abroad up to the former normal times for closing. The Government are wavering between 6, 6.30, and 7 o'clock as the fixed time for compulsory closing, other than on Saturday evenings. We shall know almost immediately what is their final decision; but, whatever it is, any one of the times named would not make a great departure from the closing hours adopted by the principal retail houses last winter.

Federation of British Industries.

Glancing down the list of members of the Executive Council of the Federation of British Industries, one notices that it includes representatives of a number of very influential firms. Indeed, the list alone is sufficient to offer the assurance that the organization will prove a really serious proposition; and this assurance is further strengthened by the fact that a condition of membership is an annual subscription of £100, with an obligation to continue the payment until June, 1919. The President is Mr. F. Dudley Docker, C.B.; and in sending out an invitation to firms to apply for membership—under qualification terms which are indicated by the title—he says the Federation has been formed in order to provide a body capable of representing the interests of the British manufacturing and producing industries. The idea is to devote attention chiefly to the broader questions which affect the trade and industry of the country, and to represent British producers and manufacturers in much the same manner as the General Federation of Trade Unions represents organized labour. The work of the organization and development of industry, in co-operation with labour, and in conjunction with the Government, is to be begun forthwith, and continued after the war. The programme which the Council have mapped out for themselves is certainly an ambitious one; and if only part of it is successfully carried out, the members will no doubt agree that the Federation has more than justified its existence. After explaining that the immediate objects include the reconstruction of British trade after the war, the development of sources of supply of raw materials, and the consideration of questions arising out of

the transition from war to peace, the President goes on to remark that there will at the same time be no delay in dealing with other important points. Among such matters may be cited the efficient representation of British manufacturers abroad, the improvement of the existing commercial intelligence system, the extension of financial facilities for industry and foreign trade, and the better co-ordination and regulation of freight and transport. In addition to all this, every effort is to be made to ensure that in the future no important action affecting British industry shall be taken on behalf of the Government without due weight being given to the views of manufacturers and producers. As is remarked in the circular, for these functions to be adequately fulfilled, the Federation must be representative of the whole industry of the country.

PERSONAL.

Among the officers of the French army who have been awarded the distinction of Chevalier of the Legion of Honour is M. BOUTAN, a Director of the Lyons Gas Company.

The Directors of the Oriental Gas Company, Limited, have appointed Mr. STANLEY RAINER as Secretary, in the place of the late Mr. H. J. Luff, whose death was recorded in last week's issue. Mr. Rainer has occupied for the past 25 years the position of Accountant to the Company.

Mr. ARCHIBALD D. COUBROUGH, of Lochgelly, has been appointed Manager of the Pittenween (Fife) Gas-Works, in place of Mr. DANIEL CAMPBELL, who resigned. There were 24 applicants for the vacancy. Mr. Coubrough was for ten years with Mr. Easson, at Selkirk; while for the last two years he was at Lochgelly.

Marked distinction has fallen to Flight-Commander ALBERT BALL, of the Notts and Derby Regiment and Royal Flying Corps, eldest son of Alderman A. Ball, the Chairman of the Nottingham Corporation Gas Committee. This young airman joined the Sherwood Foresters as a private soon after the outbreak of war, and in October, 1914, was granted a Commission. Obtaining his transfer to the Royal Flying Corps, he was in July last awarded the Military Cross for conspicuous skill and daring upon many occasions. To his credit, it was recorded that he had then done great execution among enemy aeroplanes—attacking six in the course of one flight, forcing down two, and driving the remainder away. This brave feat was accomplished several miles over the enemy lines. The official announcement was forthcoming in a supplement to the "London Gazette," last Tuesday that the King has been pleased to confer upon him, not only the Distinguished Service Order, but a bar to the Order for a further act of conspicuous gallantry. Since being at the front, he is credited with having brought down over twenty hostile machines; and it has been learned that, to the official record of his gallantry, Sir Douglas Haigh attached the note "Well done. D. H." A recent supplement to the "Gazette" contained the War Office announcement as to his promotion from the position of Flying Officer to that of Flight Commander, and to be temporary Captain while so employed.

OBITUARY.

Feeling reference was made by the Lord Provost of Edinburgh (Sir Robert K. Inches), at a meeting of the Gas Commissioners last week, to the death—from peritonitis, following an operation for appendicitis—of Treasurer M'MICHAEL, who had served nine years as a Commissioner, and had occupied for two years the position of Convener of the Finance and Law Committee. The late Treasurer had attended the meetings with great regularity, and had always taken a keen interest in the many subjects which came before the Board. "Possessed of great natural ability," to quote the "Scotsman," "and a distinct individualty of character, Mr. M'Michael had held for a number of years an outstanding place in the municipal life of the city."

National Insurance (Part II.) (Munition Workers) Act, 1916.—The Umpire has decided that contributions are payable in respect of all classes of workmen engaged in the distillation of tar. Contributions are not payable in respect of workmen employed by water companies as pipe-layers (if not insurable under Part II. of the National Insurance Act, 1911), or as engine drivers, stokers, boiler cleaners, coal heavers, filter attendants, meter cleaners, meter readers, turncocks, waste inspectors, or storekeepers.

North of England Gas Managers' Association.—The full programme of business has now been issued for the half-yearly meeting of the North of England Gas Managers' Association, next Saturday, at Newcastle-upon-Tyne. After an address by the Acting President (Mr. William Hardie, of Tynemouth), papers will be read by Mr. A. B. Walker, on "Coke-Handling Machinery at the Howden Lane Gas-Works, Wallsend-on-Tyne," and by Mr. A. B. Roxburgh, on "Some Experiences in Selling Gas for Industrial Purposes."

BRIGHTON ELECTRICITY DEPARTMENT AND LOW-TEMPERATURE CARBONIZATION.

BEFORE the Brighton Town Council enter into the scheme with the Coalite Company [an outline of which was given in our "Miscellaneous News" columns last week, p. 619] by which it is proposed that the Corporation lease the Company a site for plant, and take gas for electricity generating purposes, and the Company the whole of the other products, we would suggest that they should take counsel (say) with Mr. F. D. Marshall, obtain from him a report, and then appoint a competent arbitrator to settle any differences between him and the Coalite Company. Up to the present, we do not see that the Corporation have done anything sufficient in the way of securing themselves. They have had a report from Mr. John Christie, their own Electrical Engineer, who is not a Gas Engineer and Chemist; they have had a report from Mr. W. B. Woodhouse, also an Electrical Engineer, and not a Gas Engineer and Chemist; also a letter on behalf of the Coalite Company, from Mr. F. W. Salisbury Jones, who is famed as a Company promoter, and is not a Gas Engineer and Chemist; while the Editor of the "Electrical Times"—also not a Gas Engineer and Chemist—hopes the Council will "accept the scheme." The last-named is desirous of seeing a trial made; Mr. Woodhouse, in his report, dealing with the prospects of success, remarks that "no one can say more on this point until practical experience has been gained with the new type of coalite plant now in course of construction at Barnsley." It would be of interest to know how far the constituent parts of this plant deviate from the plant that is used on many gas-works to-day, and in what particulars the Coalite Company claim special rights to it. It is not likely that our curiosity will be gratified; but Mr. Christie might do worse than ask a neighbouring engineer who knows something of modern gas-works carbonizing and other plant to run down to Barnsley with him and enlighten him on the subject of differences. The Lighting Committee's report has been deferred to the October meeting of the Council; and a little more delay would not matter much, in order to secure a larger amount of information, and to look well into the question of guarantees before proceeding further.

A part of Mr. Christie's report that reads as very funny to anyone concerned in coal carbonization is where he speaks of gas and all the other valuable distillates that arise from the carbonization of coal, and adds: "The Company suggest that, by the establishment of works of this description throughout the country, our coal supplies would be conserved for the benefit of the nation, and *thus enable many of these important industries to be fostered at home.*" The industries referred to were in existence in this country long before the Coalite Company started its chequered capital dissipating career, although not to the extent that it is hoped they will be in future. Up to the present, however, the Coalite Company have not contributed much in the way of raw material to the support of these industries; but the Germans have hitherto purchased from the carbonizing industries of this country large supplies of the raw materials they require for similar industries. These raw materials might just as well be retained in future for "fostering" home industries instead of those of Germany, which country appears to have got on very well without the assistance of the Coalite Company.

There are certain features about the Brighton gas scheme for electricity generating purposes that are interesting. It is seen that the plant proposed to be constructed is to be capable of carbonizing 200 tons of coal per day, and that the "first installation" will yield, in addition to the "coalite" and the other residuals, approximately 4,800,000 cubic feet of gas per day. Now no low-temperature plant *per se* will produce 4,800,000 cubic feet of gas from 200 tons of coal. This production would be equal to 24,000 cubic feet per ton of coal! even assuming the "first installation" to be equal to 200 tons per day. The figures show (and this is confirmed by the value of 300 B.Th.U. per cubic foot) that the proposal is low-temperature carbonization *plus* a producer plant for making further gas from the coalite, which is practically Mr. Marshall's scheme, though the low-temperature carbonizing plant is different in design and operation. The details of the report given last week are well worth reading. The proposed charge to the Corporation is 1¼d. per 1000 cubic feet for 300 B.Th.U. gas (when coal is at 20s. per ton), with a sliding-scale of 5 per cent. up or down in the charge for every increase or decrease of 1s. per ton. Assuming a thermal value of 14,000 B.Th.U. per lb. of coal, this would represent per ton 31,360,000 B.Th.U. At 1¼d. per 1000 cubic feet, 20s. would purchase 160,000 cubic feet of gas, which, multiplied by the 300 B.Th.U. per cubic foot, would give 48,000,000 B.Th.U. So far, on the calorific basis, if the standard and price are maintained, and the Company do not fail them, the Corporation would gain; but no Corporation of the position of that at Brighton, with the responsibilities upon them of a statutory public service, can afford to rely on a non-statutory company in this way without having some part in the control, and not be wholly dependent upon them. Otherwise permanent precautions will have to be taken independent of the Company.

After all, is the scheme really the best one? The report states: "Assuming that 110 cubic feet of gas are required per KW. hour against 3 lbs. of coal, the cost for fuel, with coal at 20s. per ton, will work out at 0·165d. per unit for gas, as against 0·3213d. for coal, equivalent to a saving of 0·1563d. per unit." This is attractive for gas compared with coal. But what has Mr. Marshall

recently offered: Electricity delivered at 0·062d. per unit (less than half the price of the gas per unit under the coalite scheme), by using 130 cubic feet of 130 to 140 B.Th.U. gas in gas-engines, while he reckons that only 200 cubic feet of the same gas burned under boilers would provide, per unit of electricity produced, the steam for turbine-driven plant, compared with 110 cubic feet of the 300 B.Th.U. coalite gas. Mr. Christie reckons that the scheme he has submitted will give him gaseous fuel at, per unit, half the cost of coal; but Mr. Marshall suggests electricity at one-fifth of the coal cost, reckoned at 20s. per ton. If Mr. Marshall is correct, then it is a question whether Mr. Christie (there may be differences in the sizes of the units of plant) has got to the bed-rock of economy in what he is suggesting.

The vital points about all these low-temperature schemes are market prices for coal and products; and they have a tantalizing way of not always keeping at the estimated values. However, so far as the Brighton Corporation Electricity Department is concerned, only the market price of coal affects the proposal, together with the question of whether all will work out as the Coalite Company suggest, and whether, if "all" does not do so, the Company will continue running on the terms named. The history of the Coalite Company has not justified all the fulsome statements once made in connection with its plans; but we admit that time, experience, and wasted money and energy may have united in producing moderation.

OVERTIME AND INDUSTRIAL FATIGUE.

Particulars are now available, in the form of a Home Office Blue-Book, of an investigation of industrial fatigue by physiological methods, carried out by Dr. A. F. Stanley Kent, M.A., of Bristol University. The report is a second interim one, and deals with a continuation of former experiments on the subject undertaken on behalf of the Home Office. The work has been in progress for some years; and it is now occupying the whole of the time of three investigators. Not only have the circumstances of labour been studied, but also the home conditions of the workers, their general health, and other factors which seemed likely to have a bearing on the matter under consideration. The report is divided into three sections; the first dealing with fatigue as a result of overtime, the second with the influence of fatigue and of overtime upon output, and the third with more general matters. Since the stage of the investigation here set forth was reached, much material has been obtained; and this, so far as it has been examined, corroborates the conclusions arrived at.

In the first part, it is pointed out that the effect of labour, other things being equal, will depend upon its severity and its duration; but the relation between these factors and the net result is not a simple one, as even a slight lengthening of a task may result in the production of an altogether disproportionate amount of fatigue. It has been thought that the simplest method of increasing output in times of stress is to add to the number of hours in the working day; but extra hours must necessarily be added at the end of a day's work, and the result will vary according to the previous condition of the worker. If the previous work has been severe, of course, the extra labour will produce a greater effect than would otherwise be the case. Further than this, results show that overtime has an effect which is not confined strictly to the day on which it is worked; while an overtime day introduced towards the end of the week is more harmful than one worked nearer its beginning. At the same time, it has to be borne in mind that the severity of the symptoms of fatigue exhibited by an individual worker at a particular juncture will depend upon a large number of causes, to understand which it is necessary to study the worker's home life and surroundings, as well as the conditions existing inside the factory.

Dealing with the conclusions to be drawn from the investigations detailed in the second section of the report, Dr. Kent says that, where the factory day consists of four working periods, output is low during the early morning period and overtime. During the two middle periods of the day, output is normally high, but is lowered by working overtime. In fact, this diminution is often so great that the total daily output is less when overtime is worked than when it is not, and "thus overtime defeats its own object." Frequently the lowest output is found in the period of overtime at the week end. The unsatisfactory output during overtime is due to fatigue. The poor result of the early morning period which was also noticed is said to be due to a number of causes which "arise indirectly from excessive hours of labour." Where no overtime is worked, output during the different periods of the day is more equal. In support of the contention that a worker employed for fewer hours a day may produce a greater output than another of equal capacity working more hours per day, the statement is made that one group of workers showed an absolute increase of over 5 per cent. of output as a result of a diminution of 16½ per cent. in the length of the working day, while another group substantially increased their average rate of output as a result of shortening the day from twelve hours to ten, and made a still better showing on a further shortening of two hours.

In the final section, one of the matters discussed is the influence of overtime upon the general health of the worker; and here it is stated that, so far as can be gauged by the tests, the general health of the worker, upon which his rate of working and his powers of endurance depend, appears to be prejudiced by the introduction of overtime, and to a less extent by work in the early morning hours. In every case, the suspension of overtime was followed by an improvement in the condition of the worker; and in a large proportion of instances, this condition was further improved by stopping-off work in the early morning hours.

The report is accompanied by a number of charts indicating the results of the investigations.

CALORIFIC STANDARD ACT APPLICATIONS.

Fourth Official List.

The Local Government Board intimate that the following further applications have been received by them from Local Authorities for Orders under the Gas (Standard of Calorific Power) Act, 1916. Aberavon and Wath and Bolton propose a standard of 500 B.Th.U. In the cases of Oswaldtwistle and Stalybridge no figure is stated; but we are informed that 500 B.Th.U. will be suggested by the Department if the applications are entertained.

Aberavon Town Council.
Oswaldtwistle Urban District Council.
Stalybridge Town Council.
Wath and Bolton Gas Board.

The following Companies are applying to the Board of Trade for orders, with a power of 500 B.Th.U.

Gorleston and South Town Gas Company.
Runcorn Gas Company.

The opposition to the Brighton Gas Company's application is reported elsewhere to-day, p. 38.

The Ilford Urban District Council have received notice of the Ilford Gas Company's intention to apply for an Order, and have instructed the Clerk to lodge objection.

The Walthamstow Urban District Council have considered a letter from the Lea Bridge District Gas Company, giving notice of application by them for an Order, and have decided to recommend the Council not to oppose the proposal. The Leyton Urban District Council also, on the recommendation of the Highways and Lighting Committee, have decided not to oppose the Lea Bridge Company's application. The Committee stated that they had considered a report of the Gas Examiner as to the effect of the proposal, from which it appeared that the suggested substitution of a heat standard for a light standard would be more scientific, and in accordance with consumers' present requirements.

The Parliamentary Committee of the Northampton Town Council, in connection with the Gas Company's application, report that such a standard as that asked for would have the effect of reducing the illuminating power of the gas. The value of the gas for heating and power purposes would also be diminished considerably. Other companies had made similar applications, and the corporations concerned were raising objections thereto. The Committee are of opinion that, if the proposals of the Company were sanctioned by the Board of Trade, the gas consumers in the town would suffer considerable loss; and they think, therefore, that the Order asked for should not be granted except with considerable modifications. The Committee have resolved that the Town Clerk take the steps necessary to oppose the Order, and have appointed a Sub-Committee to deal with any urgent question that may arise, as well as obtain any evidence and expert assistance which may be considered necessary in support of the objections.

It was mentioned at a meeting of the Southgate Urban District Council that notice of objection has been given by the Council to the application of the Tottenham Light, Heat, and Power Company for an Order, so as to secure *locus standi* at the Board of Trade inquiry. Reference to the matter afforded an opportunity to one of the members to point to the "many meter complaints that have been made," and to suggest that, if these are due to what is now taken from the gas for high explosives, the Company should recognize the fact, or if not give some explanation. The Clerk stated that a conference of public authorities is to consider the proposed change of standard. The Wood Green Urban District Council, on being informed by the Clerk of places that have agreed to a similar change, have decided to offer no opposition to the Company's application.

At a meeting of the Kingsbury Urban District Council last week, it was reported that the Harrow and Stanmore Gas Company had forwarded notice of an application for an Order, and that the Clerk to the Harrow District Council had written suggesting a conference of local authorities for the purpose of discussing what further action (if any) should be taken in the matter, one representative, with an official if desired, to attend from each body. Mr. Stanley said that the quality of the gas was abominable; and he did not know why the Company should reduce still further the illuminating power. Other members agreed with these remarks; and it was resolved to attend the proposed conference.

Next Week's Meeting of the "B. G. I."—We have been asked to specially call attention to the fact that the meeting of the members of the Society of British Gas Industries next week will be held at the Holborn Restaurant, and not at the "Trocadero," as has been the case with recent meetings.

ELECTRICITY SUPPLY MEMORANDA.

THE electrical papers are bursting with consideration of the fuel question, on the lines of low-temperature carbonization, and recovery of all sorts of products, including sulphate of ammonia.

Our Benevolent Friend.

Through a scientific utilization of fuel, it is hoped by some—and the ability to do it is doubted by others—to cut-out the gas industry, unless that industry (as an editorial note appended to the letter of Mr. F. D. Marshall, in last week's issue suggests) happens to bestir itself, and performs that operation upon the electricity supply industry. Mr. Marshall has written a letter to the "Electrical Times" on the subject of his cheap electricity producing scheme—the letter being in reply to some remarks by "Meteor," to which reference was made in the "Memoranda" on Sept. 12 (p. 495). By speaking of electricity production at 0·1d. and 0·062d. per unit, Mr. Marshall has no doubt been setting to work at high pressure the salivary glands of many electrical engineers, as well as inducing "Meteor" to turn upon him further sarcasm from his inexhaustible store. Mr. Marshall, in his letter, says he has been thinking deeply over the problem of how in some way to link-up the two great industries and prevent ruinous competition—that is a very benevolent thing for him to do. How "ruinous competition" is to be prevented is seen when our friend tells his readers that he has long held the view that the gas companies should be the factor of producing electricity in bulk, and that the electrical companies should distribute it. He goes on to excite the greatest of joy in the camps of the electricians by remarking: "I am of this view because I feel that it is only a question of time before electricity will supplant gas illumination." The gladness of the electricians arises from the fact that this is said by one who is first and foremost a gas engineer, though to the electrical engineers the statement is not new, because they have been saying the same thing from the year 1882. However, being first and foremost a gas engineer, Mr. Marshall is desirous of pointing out a way by which the gas companies can save the situation, and at the same time be helpful to the electrical undertakings. Supposing the electricity people will not work with the gas industry, and supposing they prefer to work with colliery people who may be willing to adopt Mr. Marshall's scheme, then that gentleman's benevolent intentions in pointing out a way by which the gas companies can save the situation will fail of their purpose. However, the point of preference in collaboration is only incidental to the plan, which is founded on Mr. Marshall's conviction that whether raw coal is burnt under boilers for steam, or whether gasified in producers for power gas, there must be a terrible waste of heat and bye-products—oils petrol, and ammonia—and that an intermediate stage is necessary whereby the bye-products can be realized, and practically pure carbon—coke—be supplied as the medium of power raising. There is one thing that cuts us to the quick; and it is where our old friend asks "Meteor" to note that the "JOURNAL OF GAS LIGHTING" is "far from friendly to me or my suggestions." That is very unkind. Our comments have not been personal, but have been directed more to the effects of Mr. Marshall's scheme upon the respective fortunes of the gas and the electrical industries.

Gas-Engines and Ammonia.

Mr. Marshall administers another shock to the men of the electrical industry. They have pinned their faith to steam-turbines—no matter whether the steam is raised by coal, coke, or gas. But their objective in economy is to use gas under the steam-boilers, after recovering the other products from the fuel. Now our friend says to the electricity industry: "There is one point I wish to emphasize, and that is, if you want cheap electricity, it *must* be produced by gas-engines." The grounds on which he makes this assertion are three. The first is: "My Continental experience clearly (to myself) proves my assertion. Hardly any electrical undertaking of magnitude on the Continent is run by steam-turbines; and the great Nuremberg firm—'M.A.N.'—have installed numberless installations of magnitude—all based on gas-engines and producer gas." The second is: "A gas-engine and producer gas will produce electricity at practically half the price of a steam-driven plant, principally because you recover the great asset ammonia." The third is: "The British Westinghouse Company say: If you will give us the power gas for nothing'—which I can do—'we will produce it for one-twelfth of a penny or less—by gas-engines.'" The ability of Mr. Marshall to supply the power gas for nothing therefore depends on the financial side of his plan, in which one of the main factors is "the great asset ammonia." And ammonia produced from the carbonization of coal has yet to meet the most critical period in its commercial history. There are serious doubts surrounding sulphate of ammonia; and Mr. Marshall well knows it. Good grounds exist for fearing that, when the German and other competition in synthetically produced fertilizers is again let loose, not even pre-war prices for sulphate of ammonia, to say nothing of current ones, will be realized. At the recent meeting of the British Association, Professor Louis remarked that chemists were blaming the engineer because he used coal purely and simply as a source of fuel, and did not go to work to save the 2 per cent. or so of nitrogen in the coal. [Of course, there is something more than nitrogen and thermal value in coal.] And then he asked whether the chemist had reflected that he had as much atmosphere as he liked for nothing, with 80 per cent. of nitrogen in it? But he admitted that the question turned upon the point as to which was the cheapest way to continue the work. The light way in which Professor Louis spoke of the nitrogen in coal was not approved by Mr. R. Maclaurin, who is the inventor of one of the low-temperature processes. He pointed out that the amount, as a matter of fact, was nearer 1·4 per cent. than 2 per cent. If the whole of the 1·4 per cent. could be taken out, he said it would mean 12s. per ton of coal. The theoretical standard is not likely to be attained; but Mr. Maclaurin told his hearers that it is possible to get 90 to 100 lbs., at 1d. per lb., per ton of coal—a fair figure, which would bring in a return of about 8s. These figures are subject to market conditions; and so, too, is Mr. Marshall's "power gas for nothing." Coal is going to cost more in future than before the war, and secondary products are not going to maintain luxuriant values. We will not refer to the figures in Mr. Marshall's letter as to costs, which figures were criticized by "Meteor," and which Mr. Marshall has told "Meteor" he has misinterpreted, in reply to which "Meteor" shows that he is still overwhelmed with doubts, and refuses to pin himself down to figures. So the merry game goes on, and will continue until one of the "M's" gives in.

Complicating the Work of the Electrical Engineer.

It was recorded last week that Mr. R. A. Chattock, the Electrical Engineer of Birmingham, is not by any means in agreement with the idea that a gas manufacturing and chemical product plant should be added to the responsibilities of the electricity engineer, who, he thinks, has ample work to occupy him in looking after the generation and distribution of current, and the direct concerns generally of an electricity undertaking. Mr. W. W. Lackie, the Chief Engineer of the Glasgow Corporation Electricity Department, is of much the same view. At the last meeting of the Incorporated Municipal Electrical Association, Mr. Lackie read a paper on "Boiler-House Design and Operation;" and he has since contributed to the proceedings a reply to the discussion thereon. In the course of this, he says:

> If, however, the line of development is to be by way of the gas firing of boilers, and the production and sale of bye-products other than gas, it seems to the author that it is outside both the sphere and the function of the electrical engineer to be responsible for the production and sale of large quantities of coke and other bye-products; and we should not be called upon to bear the cost and to suffer the trouble and inconvenience of the experiments which are likely to be necessary for a considerable time to come before the gas firing of boilers becomes a commercial proposition. The author submits that the hands of the electrical engineers are quite full with their own legitimate business of the generation of electrical energy, and to ask them to undertake work which really belongs to the sphere of the practical chemist and the gas engineer is simply to lower their efficiency in connection with their own work, and to hamper and hinder the developments in various important directions which all hope and believe are possible if not imminent.

This shows that Mr. Chattock is not by any means favourable to increasing the complication and raising the weight of the electrical engineer's functions and responsibilities. But "Electrical Industries" has great faith in the capacity of the electrical engineer for coping not only with his own legitimate work, but in handling all the technical and the scientific processes associated with gas manufacture and chemical production, as well as dealing in the several commercial markets in which the gas man operates—all of which varied work requires very long and special training. Our contemporary cannot see why an electricity department should become a customer of a gas department in the matter of fuel. The old jealousy will out. Why object to be the customer of a gas department any more than the customer of a colliery owner? However, "Electrical Industries" finds Mr. Lackie's attitude most depressing and reactionary, which shows how badly it feels any notion of uniting-up with the gas industry in this matter. So far as we understand our contemporary, it would have the electricity industry start *de novo*, set up all the necessary works, then strangle the gas industry and the bye-products dealers, and take over the whole of the technical and commercial work themselves. This is highly interesting and highly ambitious; and *if* the electricity industry takes our contemporary's advice, it is hoped they will not make a mess of the enormous new undertaking. That would be a pity.

Strange Accidents.

There have recently been some curious fatalities through electricity. There is the Hebburn case, in which a munition worker named Dickson met with his death by coming in contact with a street-lamp standard which was charged with electricity through one of the cable wires getting into contact with the switch chamber at the top of the standard. The voltage was not more than 240. Another curious accident befel a boy named William Atkins, when working at a vice at an engineering works close to where the halves of a tank were being welded by electricity. A plater accidentally caught his foot against a piece of angle-iron one end of which was on an end of the tank, the other catching a leg of the vice. In this way the vice became charged. The voltage was only 110; but the boy died from shock. At a Glasgow factory, a man named M'Ginlay accidentally put his foot on a rail charged with electricity. He was unable to release himself until the current was switched-off. He then fell some 30 feet, death following through the fracture of his skull.

COAL ECONOMY IN LONDON.

By E. W. Nicol, A.I.E.E.

Current interest in the subject of utilizing the national coal resources to greater advantage, and prevent smoke formation, justifies the publication of further data relating to the use of gas coke for steam-raising.

The propagandist work of the London Coke Committee (an Association of London and Suburban Gas Companies) has induced many important steam-users in London to substitute smokeless gas coke as fuel for their boilers, in place of the hitherto staple coal fuel. Argument in favour of coke has necessarily been based principally upon the financial advantages that would accrue to the user; but, viewed from the national standpoint, the educational work accomplished by the Committee is of no less moment, inasmuch as the prodigal use of raw smoke-producing coal in London has been appreciably diminished, and the use of bye-product smokeless coke for steam-raising—hitherto regarded with scorn and prejudice by all but a few obscure but more discriminating steam users—has been very largely extended. The resulting experience gained, and the data collected by engineers and others, hitherto frankly sceptical as to the possibility of using coke exclusively for steam-raising, can only react to the national benefit. Moreover, the bulk of the 2 million tons of coke annually produced in London is made from seaborne coal; and the extent to which coal traffic has been relieved on our over-taxed railways, by the substitution of London made coke for rail-borne coal, may be gauged by the number of local factory and other steam-boilers now being exclusively fired with coke.

Since the outbreak of war the London Coke Committee have supplied for use on steam-boilers about one hundred and fifty sets of their coke-burning forced-draught apparatus. At a conservative estimate, each set will consume 500 tons a year—aggregating to 75,000 tons. In addition to this, there is at least an equal amount of coke now being consumed in boilers, with little or no modification whatever in the former conditions of draught; while mechanical stokers of various types have been modified to use up to 50 per cent. of coke. The incidence of the war, and conditions of fuel scarcity brought about by the diminished output of coal and the difficulty as well as the cost of transport, have provided good opportunities for propagandist work among steam-users. Notwithstanding these conditions, the introduction of coke for steam-raising, after inherent physical difficulties have been overcome, has, while realizing a fair value, invariably shown a substantial financial saving. Its introduction in these circumstances should therefore remove any misgiving as to the disposal in the future of high temperature coke, since it gives promise of continued favour at a price which need only be adjusted to the curent rates of competing fuels in order to secure continued preference. The present conditions of the coal markets are probably little if any more acute than those obtaining during the national coal strike of 1912-13—a period which witnessed an abnormal demand for coke, and, incidentally, the formation of the London Coke Committee for disposing of the enormous coke surplus which quickly followed.

Among fuel-users on a large scale, public bodies, who usually buy by forward contract, are probably the more difficult of access and conservative in their methods. It is, therefore, a considerable satisfaction that some of the more important metropolitan institutions are now included in the number of steam-users who have been wholly or very largely converted to the advantages of coke fuel for steam-raising. In addition to various county and borough authorities who now testify to the practical utility and economy of coke as a boiler fuel, there are the Metropolitan Water Board and the Metropolitan Asylums Board. Both these important Boards are now large users of coke for steam-raising; and except for trifling modifications made on mechanical stokers to accommodate coke fuel, no alterations to existing furnace conditions have been found necessary in order to realize the normal output of steam required of the boilers. This is no doubt due to the provision of ample grate-area, and the strictly limited rating of the boilers to economical and efficient conditions of stoking. In many privately-owned steam-plants, the short-sighted limitation in expenditure of private capital in this direction is responsible for much of the gross waste of the national fuel capital that is the inevitable consequence. In various well-conducted public institutions, the designed rate of fuel combustion is wisely limited to about 10 lbs. per square foot of grate per hour. In others, both public and private, rates of 20 lbs., 30 lbs., and 40 lbs. are common with relatively varying degrees of inefficiency; while at 200 lbs. per square foot of grate—the hourly rate of coal consumption approached by a modern express locomotive running to schedule—the climax in both waste and inefficiency appears to have been reached.

Economies which might be promoted by means of a State-imposed rating of steam-boilers on a non-volatile fuel basis are indicated by the following results summarized from the daily boiler reports of one of the many well-conducted institutions of the Metropolitan Asylums Board, where the yearly coal consumption was 3000 tons. A brief analysis of the figures will show that while this steam plant is working at a lower fuel cost than most similar plants fired with coal at present prices, the overall thermal efficiency (approximately 78 per cent., assuming the average calorific value of coke as sold at 12,000 B.Th.U) is well above the average realized with coal-fired boilers. In addition to the saving in weight of fuel actually fired (and thus released for export) as compared with the bituminous coal formerly in use—viz., 10 per cent., or 300 tons per annum—the yearly saving that should accrue to the nation, in residuals recovered in the process of gas making by the substitution of coke for raw coal fuel on this plant alone, includes 30 tons of sulphate of ammonia (fertilizer), 6 tons of high-explosive munitions of war, and the numerous fuel and other industry-promoting products of 30,000 gallons of coal tar.

Date, 1916.	Economizer.		Pounds of Water evaporated per Pound of Coke as Fired.	
	Inlet.	Outlet.	Actual.	From and at 212° Fahr.
June 27	120°	240°	9·06	10·18
,, 28	115°	225°	8·31	9·34
,, 29	120°	215°	8·67	9·74
,, 30	120°	210°	8·45	9·49
July 1	120°	215°	8·84	9·93
,, 3	120°	210°	9·0	10·11
,, 4	120°	230°	9 38	10·54
,, 5	120°	225°	8·93	10·02
,, 6	120°	225°	9·03	10·14
,, 7	120°	225°	8·60	9·66
,, 8	120°	240°	9·16	10·29
,, 9	115°	225°	9·02	10·13
,, 10	115°	225°	8·52	9·57
,, 11	110°	230°	8·87	10·05

Inlet temperature maintained by means of live steam for which no allowance has been made.

Average pressure (24-hour day) 60 lbs. Average fuel cost of evaporation per 1000 gallons, from and at 212° Fahr., 12s. 5d.

AN AMERICAN ASSOCIATION OF GAS INDUSTRIES FORMED.

The number of "Gas Age" [New York] for the 15th ult. announces the formation of a permanent organization, called the Association of American Gas Industries, and the adoption of a constitution. The object of the organization, stated in Article II., is as follows:

> To establish more reasonable, equitable, and uniform contract conditions between its members and the corporations that purchase their product.
>
> To increase the value of the service rendered by its members, and to promote a higher recognition on the part of corporations of the value of such service and its help in the development of the gas industry.
>
> This Association will neither make nor countenance any agreements affecting prices, guarantees, forms of contract, or any act in restraint of trade.

This, says our contemporary, is a candid declaration of purpose, and one to which all concerned can heartily subscribe. They will hold their annual meeting in New York City the third week in February in each year. Membership is limited to firms and corporations producing gas-works equipment; and the dues are $25 per year. . . . We welcome this new organization, and hope it will become a potent and energetic factor in the development of the gas business. It is their opportunity, and it is the opportunity of the industry to back them up in whatever may be deemed wise for the good of all concerned. . . . Theirs is the opportunity, and ours is the hope that they will rise to meet it.

Exports of Coke to France.—It is announced by the Coal Exports Committee that, as from the 26th ult., the cases of all steamers shipping coke to France or her Dependencies must be placed before the Committee for confirmation.

Enemy Firm to be Wound Up.—The latest list of orders which have been made by the Board of Trade for the winding-up of enemy businesses includes the name of the Selas Company, Limited, of Newcastle Street, Hulme, Manchester, manufacturers of installations for lighting and heating. In all, 333 orders have now been made.

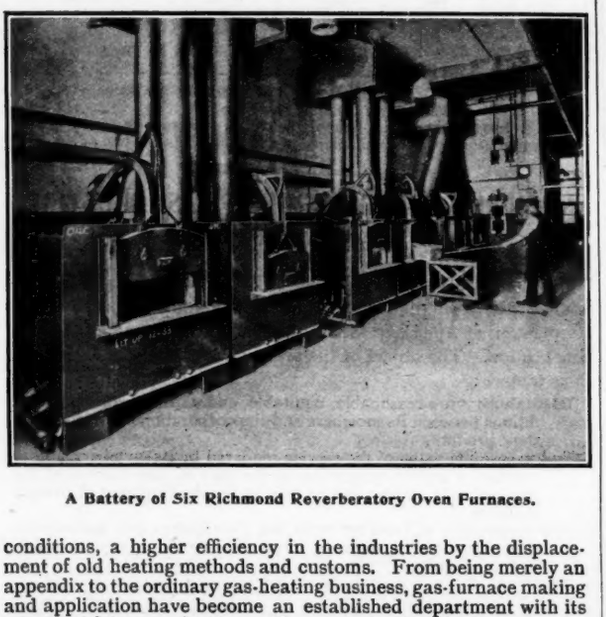
Tennis at Night by Gas.—The Laclede Gas Light Company, of St. Louis, have recently fitted up an installation of eighteen Humphrey arc lamps with 45° reflectors, to light a tennis-court, so that the game might be played at night. The effect obtained is said to be almost the equal of daylight; and the brilliant illumination enables the players to see the ball as readily as in daytime, and games are continued far into the night.

Distillation of Non-Coking Fuels.—The French Ministry of Commerce and Posts and Telegraphs, as reported in the "Journal des Usines à Gaz," has appointed a Commission to study and to originate in France and allied countries industrial processes for the distillation of fuels which do not yield coke, for the purpose of, in part, remedying the deficiency in France of coal and of obtaining distillation bye-products. The Commission includes among others M. Henry Le Chatellier, Commandant Gruner, the Vice-President of the French Central Colliery Committee, and Captains Blazeix and Guillet, of the technical staff of the Ministry of Commerce. Captain Blazeix is the President of the Commission and Captain Guillet its Secretary.

RICHMOND GAS-FURNACES IN WAR AND PEACE.

The Development of the Business.

UNLESS one is brought into intimate contact with it, it is impossible to get any clear conception of the extent to which the gas-furnace business has grown; and there is no better place at which to obtain some indication of this than at the works of the manufacturers of the furnaces, for single installations that are made of their productions do not by any means enable any fair appreciation to be made. Perhaps in no branch of industry engaged in the production of essentials to the making of guns and ammunition has there been a more romantic rise than in this gas-furnace business; and the manufacturers of gas-heating appliances have been equal to all the demands that have been made upon them, which says much for the remarkable adaptability and elasticity of their organizations. The war has yielded more demonstrations of capacity in this furnace line—capacity in design and in production in the works of the makers, and capacity of the furnaces themselves in application—than would years of slow toiling work have done in trying to bring about, by ordinary means under normal

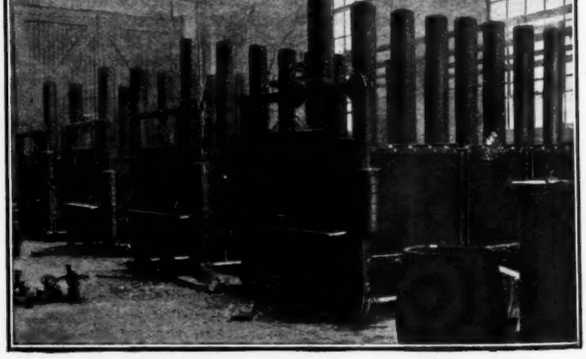


A Battery of Six Richmond Reverberatory Oven Furnaces.

conditions, a higher efficiency in the industries by the displacement of old heating methods and customs. From being merely an appendix to the ordinary gas-heating business, gas-furnace making and application have become an established department with its own complete organization, and an organization that has as great a responsibility upon it as, and perhaps a greater than, the (for example) gas-fire department; for the technicalities surrounding it are many.

Walk, for instance, through the erecting-shop of the furnace department at Warrington, of the Richmond Gas Stove and Meter Company, Limited, and see the quantity of work that is going forward, and in variety large and small, and consequently for consumptions of gas corresponding. Such an inspection is an eye-opener in several ways, and one is that in the industrial gas-heating business, notwithstanding the (in association with munitions work) large demands that have been made for the efficiency realizable by gas operation, we are but at the dawn of an exceedingly vast business for the gas-supply industry. The interests therefore of the makers of the furnaces and of the suppliers of gas are mutual; and this should never be overlooked. Contemplating the prospect, one involuntarily glances backwards; and it is seen how comparatively brief is the time when laboratory furnaces represented the nascent stage of what was destined to become itself a powerful manufacture contributing to the economy and efficiency of industry, and particularly at this time to the efficiency of the country as a producer of munitions of war. Looking at the spacious furnaces now being made, and the work they are called upon to perform, they appear ridiculously large compared with the little laboratory things (which now look ridiculously small, but are useful in their place and for their purpose) with which gas-furnaces started their career.

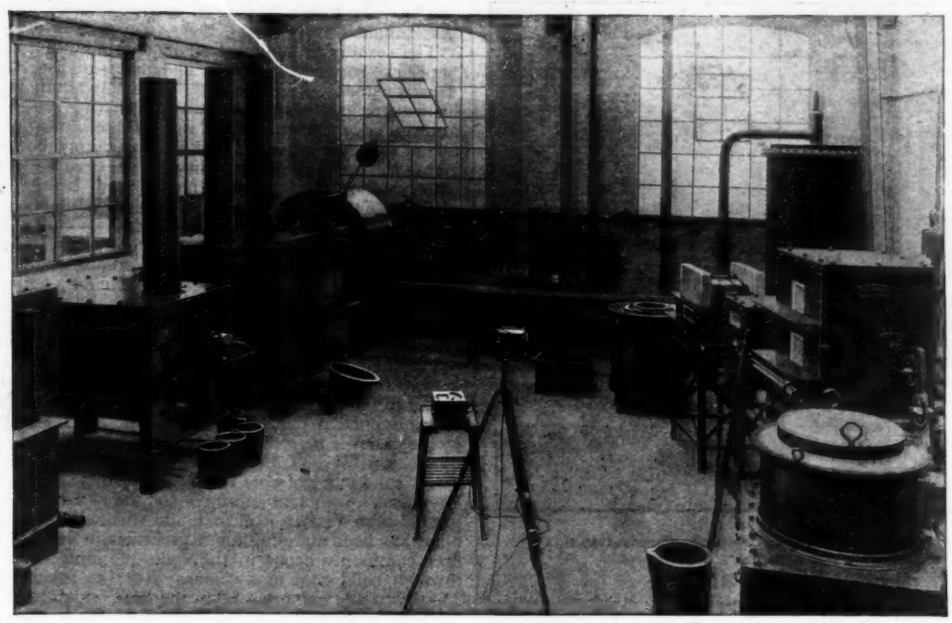
There is one war experience that should not be, as we approach the times of peace, overlooked in connection with this gas-furnace work; and it is that, though at the commencement of the war, quick installation was one of the recommendations of the gas-furnace, the adoption of the same means of heating in these munition factories has since grown and grown. This is gratifying. It is so because it shows that satisfaction has increased with experience, and that experience has demonstrated efficiency. During the past two years, we have published many illustrations of the part that gas has played in successfully equipping our armies for the field; but these illustrations, and the ones published to-day, only partly indicate the national importance of the efforts of the furnace makers. But who, when years ago interesting himself in laboratory work in which an experimental furnace had to be used, would have dreamed of a battery of furnaces for the thermo-treatment of rifle components such as is seen in the first illustration given herewith of six of Richmond's natural draught gas-heated reverberatory oven furnaces. This is only a single example of many; and among those actually in the stream of this work, the novelty of such an installation has completely worn off. However, in these furnaces, vast numbers of rifle components are case-hardened; and they are also used for annealing gun-barrels, and for the heat treatment of drop forgings. In the second illustration, there is another noble-looking battery of four large Richmond natural draught gas-heated oven furnaces—this illustration being a reproduction of a photograph taken at one of the large national shell factories, where the furnaces are maintaining a very high output. This was a rapidly executed order to meet the pressing demand that at one time existed for shells; and though the demand is greater now, the urgency is of less intensity, owing to the country's productive power (in the building-up of which gas-furnaces have rendered such an important part) having been co-ordinated with the necessities of demand and time. The four furnaces illustrated are used for annealing "18-pounder" shells and 4·5 cartridge cases. The inside measurements of each oven are 4 ft. wide by 2 ft. high by 12 ft. deep; and a constant temperature is maintained in each for any length of time. In this large and heavy work, all the claims as to gas operation permitting perfect and easy control of temperatures, absolutely even heats, certainty of satisfactory results, economy in space, great saving in labour, promotion of cleanliness, &c., have been demonstrated to apply to every condition and phase of work. One of the features of Richmond's regenerative natural draught and low-pressure gas and air oven furnaces is that there is preheating of the air, which not only supports and intensifies combustion, but also ensures a low gas consumption. Hardening heats—from about 750° to 780° C.—may be maintained in an oven measuring internally 36 in. by 24 in. by 12 in. for a gas consumption of only some 200 cubic feet per hour. These oven furnaces can be regulated to give a reducing or non-scaling atmosphere, which is a highly desirable working condition for all thermo-treatment operations. The condition, the Richmond Company say, is so nearing perfection that these furnaces are now in almost all cases preferred to the salt bath method of hardening, though they manufacture and recommend the salt bath furnaces for certain classes of work. For annealing steel in bar, the low-pressure gas and air oven furnaces are, the firm state, a decided improvement on the natural draught regenerative oven furnace, and will do the work without scaling, with the lowest possible gas consumption. Incidentally they mention that upwards of 250 steel works in Sheffield use this type of furnace.



An Installation of Richmond's Oven Furnaces for Annealing 4·5 Brass Cartridge Cases.

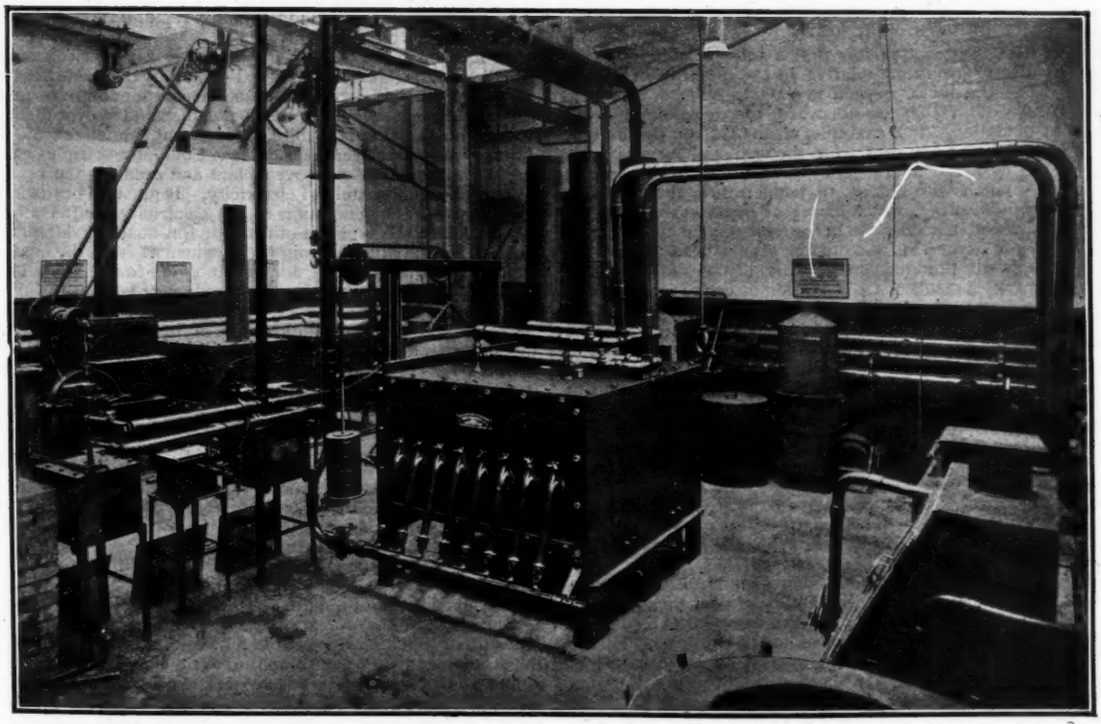
We will not say anything here about the Richmond gas and air blast hardening furnaces. They have been referred to several times; but, of course, there have been progressive improvements made in them as dictated by experience. The same may be said of forging, welding, tempering, melting, and other types of gas-furnaces, the sizes and shapes of which are of such variety that description and illustration would make a contribution too extended for our columns. But the Richmond Company have just passed through the press a tasteful catalogue which illustrates a number of installations of mammoth furnaces specially made for war work, and which contains detailed particulars of numerous other furnaces of less degree in regard to size, but not a whit less in respect of efficiency in relation to the character of the work. The catalogue relieves us from, on this occasion, referring further to the firm's furnace work, as its possession will give to those interested a large amount of information.

There is a piece of advice in the book that strikes one. It is that great care should be exercised in making selection of a furnace for the work to be done. In connection with gas-furnaces, this injunction should be made a guiding principle; for the whole justification of gas-furnaces rests upon economy and efficiency, and wrong selection of furnace would be very detrimental to the realization of the maximum in either respect. From design to

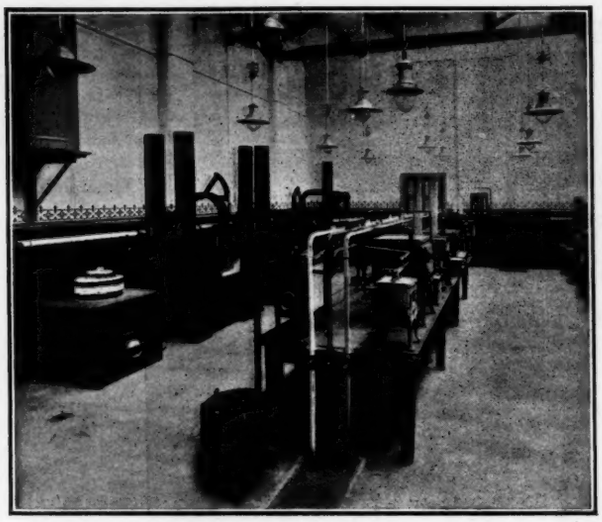


Corner of the Furnace Test and Demonstration Room at Richmond's Works.

installation in the manufacturers' works, heating by gas-furnaces needs guarding by research and trial. The manufacturers have realized this, and so have certain of the managers of the larger gas undertakings. In Richmond's works they have their furnace experts and their furnace testing and demonstration room—the former specially trained for the work of furnace investigation and study; the latter equipped for the purpose of testing to prove and improve productions, and to demonstrate efficiency and worth to manufacturers. Both makers and gas undertakings have in this industrial gas-heating business to find out what is best for the manufacturers requiring such heating; for it is certain the manufacturers themselves have no knowledge or conveniences to enable them to ascertain just what is best, using gas as the fuel for their particular purpose. The work has to be done for them by those qualified; and those who are qualified are those technically experienced in the work at the factories of the makers and in the furnace departments of gas undertakings—that is to say, if the gas undertakings take steps to have men specially trained in this work, as they must do to ensure success in the business. Gas furnace testing and demonstration rooms are growing in number, and in completeness in respect of equipment. We have on previous occasions illustrated the furnace testing and demonstration rooms of the Gas Light and Coke Company and of the Glasgow Corporation Gas Department. With this article, we show a corner—and a corner only—of the furnace testing and demonstration room at the Richmond Company's Warrington works. Also illustrated is the fine furnace demonstration room of the Sheffield United Gas Light Company, which is equipped throughout with "Richmond" furnaces. Quite a large number of Sheffield manufacturers, we learn, have availed themselves of this practical means of furnace testing, using their own materials, and working out their own production costs. The ever-increasing number of gas-furnaces that are being installed in the Sheffield area has amply rewarded the Gas Company for their enterprise in this



Furnace Demonstration Room of the Sheffield United Gas Company.



Furnace Demonstration Room of the Leeds Corporation Gas Department.

direction. The final illustration shows the furnace demonstration room of the Leeds Corporation Gas Department. This is another excellent example of furthering the cause of gas for the production of munition and other industrial appliances.

SPONTANEOUS COMBUSTION AND OXYGEN ABSORPTION BY COAL.

Formation of Water in the Oxidation of Coal—Permeability of Coal to Air or Gas.

In the "Journal" issue for June 27 last (p. 678), an editorial article extracted from a series of papers, read before the Institution of Mining Engineers, on the "Spontaneous Combustion and Oxygen Absorption by Coal," the chief points in the findings resulting from an extensive investigation made by Mr. T. E. Wigmill, B.A., B.Sc., the Chief Chemist at the Doncaster Coal Owners' Laboratories, and his assistants. The Institution, at their recent annual meeting, had a further part of the series of papers submitted to them—this time by Mr. J. Ivon Graham, also Chemist at the Doncaster Laboratories. In it, the author described experiments undertaken to measure the quantity of water, if any, produced during the oxidation of coal at temperatures below 100° C.

Briefly stated, the results show that a very considerable proportion of water is produced relative to the quantity of oxygen absorbed. The amount of oxygen in water produced, expressed as a percentage of the oxygen absorbed, increases slightly with the time of oxidation. For example, at 50° C., for the first 5½ hours, it equalled 28·5 per cent.; for the next 45 hours, 35·7 per cent.; for the next 100 hours, 39·2 per cent. The percentage does not vary much with change of temperature, thus differing from the oxygen absorbed, which increases considerably with the rise of temperature; nor does the percentage appear to vary with the percentage of oxygen in the oxidizing atmosphere. However, the amount of water produced in the initial stages of an underground heating, as a result of the oxidation of coal, is found to be small compared with the amount of water already present in the coal. The quantity of the latter is quite sufficient to explain the "sweating" observed at points in proximity to a heating, though undoubtedly the moisture from oxidation increases this effect. It is evident from the results detailed that, in the determination of moisture in coal by heating in a current of air, and weighing the quantity of water given off, an error will be introduced the extent of which will depend upon the amount of samples taken, the temperature at which the coal is heated, and the length of time of heating. In dealing with a gramme sample, and heating for half an hour at 105° C., this error will not amount to more than 0·15 per cent.; but for accurate determinations it is evident that the method of heating the coal *in vacuo*, or in some inert gas (as nitrogen), should be employed.

In another paper before the same Institution, Mr. Ivon Graham discussed the question of the permeability of coal to air or gas, a knowledge of which is obviously quite an essential to a comprehension of the process of spontaneous heating in coal. In the experiments thin slabs from coal were sawn off large lumps of different kinds of coal. Some of these were cut in the direction of the cleavage of the coal; others at right angles to it. With "softs," it is found almost impossible to obtain a slab free from cracks, owing to the fragile character of the coal. With cannel, cracks also developed very readily indeed. The experiments were therefore mostly with slabs from hard coal. The permeability of the slabs to air, hydrogen, carbon dioxide, and methane was ascertained.

The results as summarized in a table that accompanied the paper are very remarkable. They show that, contrary to what is usually supposed, solid coal is extremely air-tight, and lets very little air or gas through, even with a driving pressure of a whole atmosphere. But the figures for the rate of flow of gases through a coal slab are so small that they can only be looked upon as giving the order of permeability rather than as absolutely accurate results. Here comes the practical bearing of the issues of this particular line of investigation. Although the illustration applies to a solid working face of coal, it points to the advantage of obtaining as great solidity as possible in the storage of coal, so as to prevent, as far as possible, the admission of oxygen.

With a section of a working face of coal 3 square centimetres in area—the area of the experimental slabs—calculating from the results obtained, it would take about twenty years for 10 cubic centimetres of air to penetrate to a depth of five yards. Practically speaking, the amount of oxygen that would get further than a few inches from the external surface of the coal would be *nil*, owing to the very slight permeability of the coal, and the fact that the difference in oxygen pressure outside and inside a lump of coal will never be more than about a fifth of an atmosphere. The quantity of oxygen, therefore, which can permeate any distance into a solid pillar of coal is quite negligible. Hence when through any cause a sufficient supply of oxygen or air can get to a central part of such a pillar, rapid oxidation may take place even after the pillar has been standing for a great many years. Heatings and fires commonly occur in the walls of mine main roads driven through solid coal many years after the roads have been cut. These are due to "breaks" in the coal, which let in oxygen.

These experiments at the Doncaster laboratories are very enlightening as to certain phenomena attaching to the spontaneous combustion of coal.

NOTES ON BYE-PRODUCT COKING, &c.

[Communicated.]

Pit-Head Power Stations.

The recent meeting of the British Association and the discussion thereat on "Fuel Economy" has revived interest in this question. There are really two aspects of the matter; but, unfortunately, one of them at any rate has been dropped through the death of its originator, Sir William Ramsay. The two proposals are briefly: (1) Carbonization or gasification of the coal *in situ;* (2) gasification of the coal at the surface, with recovery of the bye-products. The latter scheme is by far the more promising of the two, as it is already established in at least two districts, although even this has its limitations. It must be realized at the outset that in such schemes as those proposed two separate and distinct industries are being dealt with, each of which has its own peculiar difficulties; and any attempt to bring about their fusion under common management is almost certain to end in disaster. Co-operation there might be, but each industry must retain its own individuality if success is to be hoped for.

In the North-East Coast area, there is a power scheme—with which Mr. C. H. Merz is associated—whereby the waste heat as well as the surplus gas from the coke-ovens is made use of for generating electricity, the latter then being distributed over the district. In South and West Yorkshire, a somewhat similar scheme is operated by the Yorkshire Electric Power Company—surplus gas being taken from a large coke-oven plant and used for the generation of steam and ultimately of electricity. It must be borne in mind, however, that the generation of the electricity is after all a very minor side of the problem of utilizing the coal. Taking the case of the Yorkshire installation, the surplus gas from the coke-ovens is supplied to the Power Company at a very low figure. This can be done, because the gas is a bye-product of very little value, and the quantity is comparatively insignificant when compared with the total electric power requirements of the whole area. Supposing for a moment that sufficient gas had to be supplied to meet the demand for (say) ten times the existing power supply. The gas required would not be supplied at the same rate as at present. Consequently, the charge for electricity would have to be increased, and the advantage of cheap power would disappear. The increased cost would not be quite in proportion to the increased fuel charges, because there would be a certain advantage to be derived from generation on a larger scale. Where several coke-oven plants exist in close proximity to one another, a co-operative scheme of working might be devised whereby the whole of the surplus gas could be brought to a common centre for the generation of power. In any case, this scheme is necessarily limited to the areas where coking coal is produced.

It would seem that a more satisfactory state of affairs might be reached by a better utilization of existing fuel supplies. It is well known that much more power can be obtained by consuming gas in gas-engines than by burning it under boilers; and yet probably 90 per cent. of the surplus coke-oven gas produced in this country is utilized for boiler-firing purposes. The installation of the Yorkshire Electric Power Company at Barnsley employs the gas for steam-raising. Of course, there are other factors to be taken into account in addition to the mere fact that gas-engines give more power than steam. But in spite of all this, in view of the great

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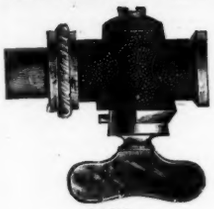

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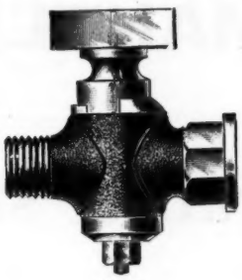

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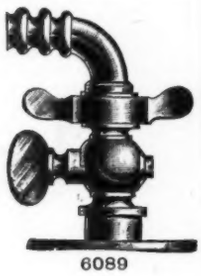

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improvement of modern high-power gas-engines it is surprising to find that it is so little used.

Another direction in which help might be looked for is the combination of gas-producers with bye-product coke-oven plants; the producers being used for the gasification of inferior fuel, washery refuse, &c., all of which is at present wasted. It is not outside the bounds of possibility to conceive such co-operation, and to utilize the existing coke-oven bye-product recovery plant for work in conjunction with the gas-producers. There is no reason why the producer gas should not be mixed with the coke-oven gas. The mixing would, of course, bring about a diminution of the calorific value of the coke-oven gas, but a diminution of 10 or even 15 per cent. would have no appreciable effect on the working of the ovens. The high yield of sulphate of ammonia obtainable from the producer gas would easily compensate for extra working costs.

Various schemes have been suggested in which it is proposed first to carbonize the coal—either at a low or a high temperature—and then to gasify the coke. These look ideal upon paper; but their economic soundness is open to question. In the operation of gas-producers for bye-product recovery, the only revenue obtained comes from either the gas or the sulphate of ammonia. From the power point of view, the producer gas just about pays for the cost of production—*i.e.*, labour costs, repairs, maintenance, &c., leaving the sulphate of ammonia to pay for the cost of the fuel. If a good class of coal is used in the producer, a good return for sulphate of ammonia is obtained, which will pay for the cost of the fuel. If, however, coke is used for gasification, the labour charges are usually higher—there being a larger bulk of ash to handle, and more frequent charging, stoking, &c., are necessary. And, what is more important, coke contains less nitrogen than the coal, and consequently yields less ammonia. Moreover, the value of the coke is at least equal to, if not considerably more than, that of a suitable coal. Several schemes of this nature are in hand at the present time, and it will be interesting to watch their development.

Direct Recovery on Gas-Works.

The announcement made by Mr. Curphey, the Chief Inspector of Alkali Works, in his report for 1915, that direct recovery on gas-works has not proved to be as successful as was anticipated, will come as a great surprise to those who have experience of the process in connection with coke-ovens, and to those who have advocated its adoption on gas-works. It is an undoubted fact—and one which Mr. Curphey admits—that direct recovery has resulted in substantially increased yields on coke-works; and one is rather at a loss to understand the state of affairs on gas-works. There must be something radically wrong either with the system itself or with the way in which it is operated when the yield falls below 17 lbs. per ton. It would perhaps have been more instructive had the equivalent yields which were formerly obtained been stated.

From other information given in the report, one is led to think that the direct recovery process is only operating at a very low efficiency. The report says: "In no case has ammonia been found to be absent in the gas entering the purifiers, and in general the amount is found to exceed the proportion met with in gas-works practice." Again, analyses of several samples of oxide show an unusually high percentage of ammonia. It is possible then that here lies the cause of the reduced yield of sulphate. Direct recovery on coke-ovens has not been brought in a short time to the successful condition in which it now exists. It has taken years of work to perfect the process, and to overcome the numerous little difficulties which beset it on all sides.

Now the gas industry has not taken advantage of the assistance which it might have obtained by utilizing coke-oven experience, but rather has it gone its own way, and started from its own beginning. Consequently, one expects to hear of the same difficulties cropping-up as those the earlier coke-oven workers in direct recovery had to deal with, but which happily they have now overcome. Theoretically, direct recovery is very simple. The ammonia is led into an acid bath, reaction takes place between the acid and the alkali, the ammonia is absorbed by the acid, and sulphate is formed. Chemists would have us believe that as long as the bath in the saturator is kept acid, complete absorption must follow. Unfortunately, this is not so, and a too rapid passage of the gas through the bath results in a considerable proportion of ammonia being carried forward. The distribution of the gas entering the saturator is very important indeed; and with inefficient distribution, even if there is 10 per cent. of free acid present in the saturator mother liquor, a certain amount of ammonia will escape. Numerous other conditions also have some effect—such as temperature, depth of seal, &c. It would be as well, therefore, in those cases where a low yield has been experienced, if continuous tests were made on the gas leaving the saturator to determine the amount of ammonia that is lost in this way. The direct recovery process is so unquestionably superior to the old indirect process that serious and immediate steps should be taken to eradicate the impression that it may not be suitable for gas-works practice.

There is also another point which is worthy of consideration. The term "direct" process is now rather loosely employed to cover both the real direct process in which no ammoniacal liquor is produced, and the semi-direct process in which there is liquor produced. The report does not make it clear which of these processes is referred to as being in use at the plants in question. If the former, one is inclined to ask, What becomes of the fixed ammonia? Is it recovered or wasted? If the former, how is it done? If the latter, what proportion of the total yield does the loss represent? If the semi-direct process is in use, with consequent distillation of ammoniacal liquor, how much of the loss is accounted for by loss by evaporation or loss in waste liquor?

The report as it stands will lead to condemnation of direct recovery without satisfactory evidence; and it is to be hoped the Inspector will see his way to go further into the matter.

WOOD DISTILLATION PLANT AT CHOPWELL.

The British Association [Section M], during their recent meeting at Newcastle-upon-Tyne, paid a visit to a portable wood distillation plant at the Crown Woods of Chopwell, co. Durham, which were at one time managed for the growth of oak for the navy. Large portions of the poor quality oak woods and coppices at Chopwell are, however, now being converted into conifer forests. But some means of disposing of, and utilizing, the unavoidable waste has had to be devised before the new crops can be laid down. One method, says the "Chemical News," is wood distillation; and the object of the experimental distillation plant visited at Chopwell is to utilize and dispose of the branch wood and other waste, and obtain saleable products from them. These products consist of: (*a*) Wood charcoal of high quality, (*b*) wood tar, (*c*) crude acetic acid, (*d*) gases.

On arrival at the place, Mr. S. H. Collins, the Chemist Adviser, explained that the plant is a portable one, but is only moved at long intervals. The chief part is a horizontal retort mounted on wheels and surrounded by a jacket which forms the flue of the fire used for heating. The solid product is charcoal, which remains in the retort. The liquid products are tar and crude pyroligneous acid; and after passing through condensing pipes leading from the retort, these are collected in barrels. The gaseous products are used for fuel. The tar has been sold for shipbuilding purposes; but a much better use is to assist in making-up wood preservatives for fences, rails, and building material for use on estates.

The pyroligneous acid is treated with lime; and, after settling, it is boiled down in a pan over the fire used for heating the retort. The resulting product is acetate of lime. About a ton of wood fills the retort, from which 5 cwt. of charcoal of the highest class is obtained, which finds a ready market.

So far the trouble has been the lack of labour; but in spite of difficulties, the current income has exceeded the current expenditure by about 5 per cent., and stores of products have been collected for future sale, against the depreciation of the plant.

Low-Temperature Carbonization.

The following appears among notes on bye-product coking in the "Iron and Coal Trades Review:" "The Times" has been devoting considerable attention in recent "Engineering Supplements" to the question of low-temperature carbonization and the better utilization of our coal supplies. Mr. F. D. Marshall, whose activities in this field have been very extensive, has again been pressing the claims of his system of low-temperature carbonization, with the idea of ultimately converting the whole of the coal into gas. Professor Armstrong, another exponent, has contributed a long article on the subject to the "Times Trade Supplement" for September. [All these articles have been recently referred to in the "Journal."] Professor Armstrong puts forward rather extreme views in his article, and apparently takes small account of either economic or practical objections which might be raised. One gathers from reading his views on the matter that, to establish low-temperature carbonization as a successful industry throughout the country, all that is necessary is a little legal formality, and that it will act as a sort of Aladdin's Lamp, and do away with the waste which necessarily accompanies the consumption of coal for domestic purposes. It is rather remarkable that the combined efforts of inventive genius have not yet been able to produce a really satisfactory low-temperature carbonization process. Professor Armstrong apparently pins his faith to the coalite process; but after the action of the Government with reference to the plant which was being installed at Barnsley to operate with this system, any existing faith in it must necessarily receive rather a set-back. Apparently, the Government think that the process which was to be installed by the Barnsley Smokeless Fuel Company is not of sufficient importance to warrant their spending any more money on it. We can only interpret this as meaning that the yield of bye-products obtainable did not come up to expectations. No doubt, low-temperature carbonization processes will continue to be placed on the market; but we are afraid it will be a long time before the average householder can be convinced that smokeless fuel is better than ordinary coal for his fire.

The Institution of Municipal and County Engineers will next Saturday hold a meeting at Watford, when a paper by Mr. D. Waterhouse, on "The New Water Supply and Other Municipal Works at Watford" will be taken as read, and discussed. In the afternoon the members will visit the new pumping-station and water-softening works and the sewage pumping-station, destructor, and electricity works.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Aberdare.

A Meeting of the Institution was held last Wednesday at Aberdare, when the New President (Mr. J. E. Kenshole, of Merthyr Tydfil) delivered his address, and Mr. H. D. Madden, of Cardiff, read some "Distribution Notes," which were well discussed. Nothing was wanting on the part of the Chairman and Directors of the Aberdare and Aberaman Consumers' Gas Company, and of Mr. A. E. Davey (their Manager and Secretary), to make the day a successful one; and in the afternoon the members were able to inspect portions of an extensive scheme of modernization which is in process of being carried out at the gas-works.

The Business Meeting was held in the Council Chamber at the Town Hall; there being some thirty members present. At the outset of the proceedings, the chair was occupied by Mr. R. A. Browning, of Neath.

Confirmation of Minutes.

The Hon. Secretary (Mr. Octavius Thomas, of Pentre) read the minutes of the previous meeting, and they were confirmed.

New Members.

Proposed by Mr. W. C. Jackson (Neath), seconded by Mr. A. E. Davey (Aberdare), Mr. Herbert Sutcliffe, Gas Manager, Gowerton, and Mr. Frederick Shewring, Manager and Secretary to the Tawe Valley Gas Company, were elected members of the Institution.

The New President.

Mr. J. E. Kenshole (Merthyr Tydfil), the new President, then took the chair, receiving a cordial greeting from the members. He said his first duty was a very pleasant one, for it was to propose a hearty vote of thanks to the retiring President, Mr. A. W. Branson, of West Hartlepool. Unfortunately, he was not able to be at the meeting that day, but they all knew why this was. During the past year, he would have been with them much oftener, had conditions permitted. His works had, however, suffered great damage, under circumstances already made public; and every credit was due to him for the manner in which he had coped with his difficulties. The time had undoubtedly been a very anxious one for him. Personally, he much regretted Mr. Branson's absence from their deliberations during the past year, for various points had arisen on which they would have been glad to have had his opinion.

Mr. J. P. Jones (Caerphilly), in seconding, said he could assure them it was not through lack of interest that Mr. Branson had not attended the meetings. His interest in the Institution was as keen now as ever. All the members would sympathize with him in the anxious time through which he had been passing.

The vote was heartily carried.

The President then delivered the following:

PRESIDENTIAL ADDRESS.

Gentlemen,—I would like to take this opportunity to again thank you sincerely for having elected me your President for the ensuing year. It is the highest honour you could do me; and I assure you I greatly appreciate it. Since first this Institution was started I have taken great interest in it; have watched it grow in strength year by year; and have noted with very great pleasure the assistance it has been to us from time to time, more especially when any question outside the ordinary routine of work or business has arisen.

Practically the whole of Europe is at war, the effects of which are felt all over the world. Millions of our best men have joined the Colours, and our Colonies have sent, and are sending, the flower of their manhood by thousands to the assistance of the Motherland, in this the greatest combat in the annals of history, to fight for the right of small nations to live in freedom and security. We all, I am sure, sincerely hope that the war may soon be brought to a satisfactory conclusion, and that when peace is declared the conditions will be of such a character as will ensure its lasting, so that the vast amount of science and skill now devoted to inventing and manufacturing means of destroying life and property may be used for the amelioration of the condition of mankind and the preservation of life.

Effects of the War.

The effect of the war on our industry varies in different districts; but the general result has been that the price of gas has had to be increased, and no renewals or replacements are being carried out that can possibly be deferred without loss to the undertakings. In some districts where munition works are established, or large numbers of soldiers are billeted, there is a considerable increase in the demand for gas; while in others the lighting restrictions and the earlier closing of shops and public-houses account for a considerably diminished output.

The new Lighting Restriction Order will further reduce the gas consumption for lighting purposes; and although it is imperative that the Defence of the Realm Act and all orders issued thereunder shall be strictly observed, and everything necessary done for the safety of life and property, many of us feel that the very stringent restrictions imposed are not only unnecessary in our districts but are a positive source of danger to the public. In some instances, however, there is already a tendency to modify the instructions originally given; and for even this small mercy we must be thankful.

The Coal Question.

The difficulty of obtaining supplies of coal, even at greatly enhanced prices, is the cause of much anxiety. What the position will be in the coming winter I will not dare to prophesy; but it is to be hoped that the powers that be will see that a sufficient quantity is available for those who have a statutory duty to perform. Personally, I have hopes that the system at present in force, of making monthly returns to the Board of Trade of the quantity of coal received, the quantity carbonized, and the quantity in stock, will prevent the necessity of any curtailment in the gas supply, although stocks of coal will probably be reduced much below what we consider a safe margin.

In September, 1915, the Government passed the Price of Coal (Limitation) Act, limiting the increase in the price of coal for home consumption to 4s. per ton above the prices of the 1913-14 contracts, with an addition of 50 per cent. to the amount previously charged for waggon hire. This, I think you will agree, was an eminently proper course to adopt; otherwise there is no knowing what prices would have been demanded, and what the effects would have been on our industry. Had the Government kept to the limit of 4s. increase, and the coalowners carried out their obligations in a proper manner, I do not think there would have been any cause of complaint. In July last, however, on the application of the colliery proprietors of South Wales and Monmouthshire, the Board of Trade—without, so far as I am aware, consulting any other interests—increased the limit from 4s. to 6s. 6d. per ton; the increase to be retrospective from June 1 last. In addition to this, there are instances where colliery owners have refused to supply the same annual quantity as they contracted for in 1913-14. Consequently, supplies have had to be obtained from other sources at a much higher price than 6s. 6d. per ton above that of the pre-war year. Another grievance is that, although through coal is contracted for—and by that is meant coal as worked by the collier—the large lumps are often separated and disposed of as large coal, while the remainder is supplied as through coal.

These are causes of a great amount of dissatisfaction; and, taking into consideration the enormous profits made and the very handsome dividends paid by the colliery companies in South Wales and Monmouthshire, I venture to say it was a grave mistake for the Board of Trade to have increased the price limitation from 4s. to 6s. 6d., and I fail to see why the gas undertakings who obtain their supplies from these collieries should be penalized to this extra extent. To those companies working under a sliding-scale with a low standard price, the effect is serious. I have in mind one such company who in pre-war times regularly paid their standard dividend of 5 per cent., and who, solely through the greatly increased cost of coal, have been compelled to increase their price for gas by 9d. per 1000 cubic feet above their standard price, and therefore to reduce their dividend to £3 17s. 6d. per cent. per annum. By the time the Chancellor of the Exchequer has had his demand satisfied, the net amount received by the shareholder will be something under 3 per cent. Should it be needful for this Company to issue within the next few years any of the additional capital authorized by their Act, it is quite obvious they will only be able to do so at a considerable discount. This will, of course, mean an inflated capital account and a correspondingly higher price for gas.

Market for Residuals.

Coke.—This market is at present a very healthy one; and it is to be hoped that full advantage will be taken of the very high price of coal to popularize the use of this fuel for domestic and other purposes. I would like here to call the attention of the members to our Commercial Section, at the meetings of which views are exchanged upon all commercial matters pertaining to the carrying on of our undertakings. The increase in the receipts for coke as shown in the weekly returns sent out by the Secretary since the section was started has been most gratifying; and I would strongly recommend those who are not members to join without delay.

Tar.—The call of the Ministry of Munitions for the adoption of the "C" process found a loyal and ready response by the gas undertakings throughout the kingdom; and although it meant a very considerable loss in revenue to the majority of us in South Wales and Monmouthshire, practically the whole of the works had the process in action in a very short time. The use of crude tar for road spraying has been prohibited; and the whole of the tar now produced is sent to the tar distillers. We in this area are

unfortunate, in that there is among the few distillers very little competition for our output. Consequently, the prices realized for this valuable commodity are not so satisfactory as might be—a commodity which, I venture to say, will be of much greater value a few years hence, when it is to be hoped this country will have recaptured her fair share of the dye industry.

Most of you have read in the Technical Press recently the Directors' report of the work done by British Dyes Limited. It appears to me from this report that substantial progress has already been made. The Board have established a Committee of Directors who give continuous attention to the affairs of the Company; a Technical Committee, who combine the heads of the technical and scientific departments, with Dr. Foster as Chairman; a Research Department, of which Professor W. H. Perkin is head; and an Advisory Council of twelve eminent professors, in addition to the members of the Technical Committee, for the purpose of increasing the number of chemists and promoting chemical research, particularly in the branch relating to coal-tar colours. The Directors have also agreed to make a grant of £5000 for the development of advanced teaching and research in tinctorial chemistry in the Huddersfield Technical College, and have offered to place at the disposal of the professors an annual grant for honours graduates in chemistry who have received special instruction in coal-tar products and who are prepared to continue their training as research assistants.

The Company acquired the Turnbridge works of Messrs. Read Holliday and Sons, Limited, and have completed considerable extensions to the works. They have also acquired an additional 343 acres of freehold land at Huddersfield. This has been connected-up by railway with the Turnbridge works, where the area already occupied by the additional works and plant is about 27 acres. An agreement has been entered into with a similar Company formed in France, with the support of the French Government, for a complete exchange of knowledge and processes, and the formation of an inter-allied company for the production of intermediates and dyes. These, I think, are all movements in the right direction.

Further, the leading automobile associations, representing the motor industry and the motorists, are greatly concerned at the high price and scarcity of motor fuel; and Professor Gray and Mr. J. E. Mitchell agree that the greatest immediate increase after the war should be looked for in benzol from gas-works tar. Mr. Mitchell estimates a possible 60 million gallons per annum from this source. How he arrives at this figure, I do not know; but it appears to me to be greatly exaggerated.

Inquiries were recently sent out to the engineers and managers of large and medium-sized gas-works throughout the country, asking if it was their intention to continue extracting benzol from the gas, as they are now doing, after the war. The replies received were, as was to be expected, mostly of the "wait and see" order; but there is no doubt in my mind that it will be continued in a large number of works, especially as the Government passed in the last session the Gas (Standard of Calorific Power) Act, enabling those undertakings that continue to extract the benzol to alter their standard of testing from illuminating power to calorific value. In fact, applications have already been made to the Board of Trade under the Act by several important companies to substitute a 500 B.Th.U. standard for their present illuminating power standard; so it is evidently their present intention to continue the process of extraction.

A very interesting article by Mr. J. B. Hobbyn appeared in the "Autocar" recently. The following are a few extracts taken from it. He says coal-tar distillation is one of the most profitable industries, and its possibilities are prodigious if this country will tackle the problem fairly. We want coal tar, and plenty of it, if we are to produce the dyes which are necessary for industries representing some £200,000,000 per annum; toluene, for explosives and for the toluidines; phenol or carbolic acid, used in antiseptic surgery, medicinal preparations, and for the production of photographic chemicals; naphthalene (a source of considerable trouble and expense when deposited in the plant at the works or in the mains and services on the district), from which phthalic acid is made and from which many dyes may be obtained, the most important of which is synthetic indigo; anthracene, which yields alizarin and Turkey red; pitch for briquetted fuel, and as a constituent of varnishes, japans, and paints.

Mr. Hobbyn goes on to say that it does not appear to be improbable that the bye-product people—and by these I take it he means the tar distillers—will have the whip hand, and will be able to dominate the price of petrol; and, judging by the fact that the coal-tar industry is vastly more profitable than others, it does not seem outside the regions of possibility that good profits can be made even if the benzol were almost given away.

This view, put forward by a gentleman chiefly interested in the motor industry, is, you will agree, an extremely optimistic one; but I believe it is a sure indication that the motor industry is looking forward to gas-works tar to provide them with a large quantity of motor fuel in the future. From a letter which I received early in September, the Editor of the "Autocar" appears to think it is possible that a combination of motor manufacturers, or one of the big automobile associations, would, even now, be inclined to enter into definite contracts with gas companies for their output of benzol after the war. With the dye industry firmly established and a large demand for motor fuel, tar must increase in value; and it is to be hoped the producers will see that they receive their fair share of the extra profits to be made.

Sulphate of Ammonia.—As you are all aware, the price of sulphate of ammonia for home consumption has been limited, and arrangements have been made for an ample supply to home consumers. The prices now realized would, in normal times, be considered satisfactory; but taking into consideration the greatly increased cost of sulphuric acid, &c., the net return is not so great as at first appears. Credit must be given to the Sulphate of Ammonia Association for their continued and effective efforts in increasing the home consumption, and in obtaining fair prices for this very excellent fertilizer; and everything possible will have to be done to further increase its use, if these prices are to be maintained, in view of the probable greatly increased production.

You may recollect that just prior to the outbreak of hostilities it was stated that the Badische Aniline Company in Germany were preparing to manufacture 500,000 tons per annum by the synthetic process, and that it could be manufactured at a price very much below prices ruling at the time. One can easily imagine what the effect would be if this quantity were put on the market, in addition to the normal output from the gas-works and the bye-products plants.

Last month, in the Patents Court, an application was made by Gas Developments Limited, of Walsall, for licences to use three German patents for the manufacture of ammonium sulphate by the synthetic process—it being then stated that the Company were ready to commence manufacture on a commercial scale, and it was thought that at the start, with a capital of between £20,000 and £30,000, they could produce 40 tons per week at a price much below £16 per ton. The licences were granted, and it is to be presumed operations will shortly be commenced. What the effect will be remains to be seen; but this, compared with the German Company, who had the assistance of their Government and a capital of £2,000,000, is a very small beginning. However, if successful, it will undoubtedly increase; and the output of these two concerns must, I am afraid, in the not very distant future adversely affect our returns for this residual product.

INCOME-TAX.

On comparing the item rates and taxes in published accounts, there would appear to be reason to think some of those responsible for the administration of gas undertakings do not give the attention to these matters that their importance merits; and it may be of interest to relate what occurred with regard to a claim made by the Merthyr Gas Company for an allowance of income-tax in respect of depreciation and obsolescence of plant. As no claim had been made previous to the year 1905, you may be sure no allowance had been granted. However, in that year we put forward our claim; and after several interviews with the Surveyor of Taxes, an agreement was come to by which we were to be allowed certain percentages annually on the written-down value of the plant and machinery.

This arrangement was carried out satisfactorily until the year 1909, when the Surveyor of Taxes informed us he had received instructions to discontinue the annual allowances and to allow for renewals as and when made. We received a circular from the Inland Revenue to the same effect. This simplified matters so far as we were concerned, as we were about to construct an entirely new works further down the valley and to discontinue manufacture on the old site. The new works were completed in due course, and a claim for renewals of the whole of the plant and machinery was then made. Our claim was thoroughly investigated by the Surveyor and an inspector from Somerset House, who visited the old works; and eventually it was agreed between us that tax on £11,000 should be allowed—the money received from the sale of the old plant to be brought into the accounts for assessment.

I was naturally very pleased that the matter had been settled in an amicable and satisfactory manner; but a few months afterwards, to my disappointment and disgust, we were informed that the Inland Revenue authorities would not agree to the allowance—their contention being that as we had removed to a new site the abandonment of the old plant must be treated, so far as income-tax was concerned, as loss of capital. Against this we appealed, and before the Commissioners argued that as the plant at the old works was worn out we were entitled to the allowance agreed upon for renewals, whether the new plant was erected on the old or the new site. The Commissioners, however, upheld the decision of Somerset House. The position then was that the authorities had repudiated the circular they themselves had issued, as well as the agreement which we had come to with their inspector; and the Company had been deprived of the annual allowances to which they were entitled.

Our next move was to give notice of appeal for these allowances and for annual allowances in future years. While this appeal was pending, negotiations, with which you are probably all familiar, were opened between the Inland Revenue and the Institution of Gas Engineers, and an agreement was come to as to what claims for allowances should in future be entertained. We were shortly afterwards notified that our original claim would be allowed. The allowance was, as a matter of fact, made on the next assessments.

There was, however, one gasholder which was not put out of use until after the commencement of the war in 1914, when the income-tax had been increased to 3s. in the pound. The Surveyor suggested that the claim for the allowance on this should be deferred until it was disposed of, as whatever amount was received for it would be subject to tax by our agreement. This

brought our claim down to the present year, 1916-17, with a tax of 5s. in the pound; and the Surveyor raised the point that it was unreasonable to claim an allowance at the prevailing rate of tax. We, on our part, argued that it was his suggestion that the claim was deferred; and as the amount received for the old gasholder would be subject to a 5s. tax, the allowance for renewal should be at the same rate. Eventually a compromise was effected, satisfactory to both sides.

These details are given as they open questions of importance to all undertakings. If depreciation allowances are being made, they are presumably at the current rate of tax; but when renewals are claimed for, on what rate should the allowances be based? Should they be at the current rate of tax at the time the plant is renewed, or should they be calculated on the average rate of tax over the life of the particular apparatus which is being claimed for? If the rate of tax is high at the time the claim is made, the Surveyor will probably say the average should be taken, as was suggested in our case; if, on the other hand, the rate is low, he will maintain that, according to the arrangement, the current rate should apply.

LOCAL RATES.

The annexed list of tabulated replies (for which I am indebted to a brother manager) to queries that had been sent out show a striking difference in the percentage of rates paid to dividends

Company-Owned Undertakings.

Annual Make.	Net Rateable Value.	Rates in Pound.	Annual Dividend and Interest.	Rateable Value per Million Gas Made.	Rateable Value to Divided Profits.
Millions.	£	s. d.	£	£ s. d.	Per Cent.
65	2700	7 9	4,003	41 10 9	67·4
237	7846	8 3	11,580	33 2 1	67·7
25	740	5 6	809	29 12 0	91·4
63	1851	6 11	3,189	29 7 7	58·0
92¾	2624	9 8	4,764	28 5 9	55·1
65½	1687	6 6	3,479	25 15 0	48·4
67·6	1706	8 6	3,438	25 4 8	49·6
69	1665	8 6	3,203	24 2 9	51·9
98	2329	6 8	3,320	23 15 3	70·1
93	2163	7 3	4,810	23 5 7	44·9
75	1715	7 0	2,520	22 17 6	68·0
106	2293	..	3,918	21 12 7	58·5
76	1626	7 10	2,002	21 7 9	81·2
75	1561	..	3,517	20 16 3	44·3
70·3	1448	6 10	3,323	20 11 8	43·5
119	2400	7 1	3,978	20 3 4	60·3
79	1557	7 10	2,768	19 14 2	56·2
65	1252	7 2	2,436	19 5 3	51·4
97	1847	6 3	3,605	19 0 10	51·2
125	2330	9 2	5,596	18 12 9	41·6
125	2283	..	6,037	18 5 0	37·8
96¾	1752	5 11	3,620	18 2 2	48·4
107	1900	8 9	4,884	17 15 1	38·9
95	1686	7 6	5,269	17 15 0	32·0
120	2089	5 0	4,942	17 8 2	42·3
116	1991	6 3	3,150	17 3 0	63·2
96	1631	7 1	3,714	17 0 0	43·9
78	1314	7 5	2,733	16 16 11	48·0
63¾	1036	7 1	2,578	16 7 7	40·2
115	1875	5 9	3,222	16 6 1	58·2
91	1460	5 9	3,790	16 0 0	38·5
83	1323	8 0	3,619	15 18 10	36·5
74¼	1172	7 2	2,787	15 14 7	42·0
63	946	5 8	2,303	15 0 4	41·0
145	2114	10 7	3,852	14 11 7	54·8
110	1581	5 6	4,000	14 7 6	39·5
80	1100	8 4	2,488	13 15 0	44·2
73	990	9 8½	2,555	13 11 3	38·7
64	834	8 5	2,050	13 0 7	40·6
68	842	6 10	2,285	12 7 8	36·8
67	768	9 0	2,478	11 9 3	31·0
70	742	6 9	3,349	10 12 0	22·1
116	1092	8 0	3,500	9 8 4	31·2
70	386	9 9	2,262	5 10 4	17·0

Gas-Works belonging to Local Authorities.

Annual Make.	Net Rateable Value.	Rateable Value per Million Made.	Rates in Pound.
Millions.	£	£ s. d.	s. d.
243	7150	29 8 5	8 6
78	1687	21 12 6	11 5
82½	1742	21 2 3	7 0
94	1863	19 16 4	6 8
100	1860	18 12 0	6 8
96	1660	17 5 10	5 6
100	1700	17 0 0	7 8
100	1700	17 0 0	9 6
106	1750	16 10 2	9 0
85	1282	15 1 7	9 0
66½	1000	15 0 9	6 8
70	994	14 4 0	7 4
66	931	14 2 0	6 8
106	1369	12 18 3	7 7½
64	766	12 0 0	8 8
105	1241	11 16 6	3 0
92	1072	11 13 0	7 1
100	1150	11 10 0	8 0
94	908	9 11 6	6 6
120	915	7 12 6	6 10
79	398	5 0 11	9 1
121	322	2 8 0	7 4

distributed by company-owned gas undertakings, and in the rates paid per million cubic feet manufactured by undertakings owned by local authorities. It was the late Mr. Thomas Newbigging who, I believe, said that the hypothetical tenant was not half a bad fellow if he was treated properly; but if you follow the list through, you will, I am sure, agree with me that while some undertakings appear to be rated most heavily, a few seem to be treated very generously. The variations at any rate are much greater than they should be.

The percentage of the rateable value to dividend distributed varies from 91·4 per cent. for a 25 million cubic feet works to 17 per cent. for a 70 million works. The amount of dividend and interest in the former was £809, in the latter £2262, or slightly over £32 per million in each case. In undertakings owned by local authorities, the rates paid per million cubic feet made varied from £29 8s. 5d., with rates at 8s. 6d. in the pound to £2 8s., with rates at 7s. 4d.—the former being a 243 million works, and the latter a 121 million works.

It may be said that comparisons of rates in terms of distributed profits or per million cubic feet of gas manufactured are open to question; and with this I quite agree. But allowing for defects of comparison in these or other ways, ignoring total profits, local conditions, &c., it is even then apparent there is inequitable rating in many of these undertakings.

It has occurred to me that one possible explanation of this inequality in rating may be due to Assessment Committees fixing a rateable value somewhat in excess of that justifiable. The money is badly wanted, and gas-works are probably one of the first sources thought of for an extra squeeze. The figures are gone into by those responsible for the administration of the undertaking; and although they are often satisfied the assessment is excessive, they decide to accept it rather than incur the expense of expert advice and the hazard of an appeal. However that may be, the inequalities exist, and a careful scrutiny of the figures on which the assessments are based should reveal in many cases strong ground for a revision.

In this connection mention may be made of the rapid development of the "free installation" work, and the increasing costs, even before the war, of materials and labour, increasing the tenant's capital. There would, of course, against these increased and heavier charges be set-off the increased receipts and a rental, covering depreciation, on the free-fitting work; but whatever the effect these adjustments might have on the net receipts, the amount of capital on which the tenant's share is calculated is increased. The 17½ per cent. usually allowed the tenant might have been a fair allowance years ago; but in view of the great appreciation in the value of money to-day, and probably for many years to come, 17½ per cent. would not now satisfy a prospective tenant.

THE OUTLOOK.

Now I have no doubt that the majority of us, when we have time to think of anything but our present worries and anxieties, wonder what is going to be the position of the industry after the war. Taking a general survey, it appears to me that money will be much dearer; and it will be many years before it will be possible to raise capital at 5 per cent. This was considered a fairly safe basis to work upon; for, as you know, a 5 per cent. stock in a sound progressive gas undertaking previous to the war could only be purchased at a premium. It must be obvious that if capital cannot be issued at 5 per cent. (the dividend usually allowed by Parliament for additional capital), then the companies, when applying for further capital powers, must ask for a higher standard or maximum dividend.

The cost of coal will, I think, remain at a comparatively high price for some time; and the probabilities are that it will not again come down to pre-war prices, especially now that additional large and important collieries have been brought under one controlling influence. It will be many years, too, before the materials necessary for renewals and extensions will come down to anywhere near pre-war prices; but it will, of course, be a great mistake to unduly delay renewals, or to defer expenditure on the modernization of works and plant, which will give a reasonable return for the outlay. In fact, with the higher prices of raw materials, it becomes more necessary than ever that the very best working results should be obtained.

The price of gas oil will also remain at a high level, due to the increased demand for it for fuel purposes and to the enormously increased freights owing to the shortage of ships.

The greatly increased cost of labour makes the adoption of labour-saving appliances more necessary than ever, if an efficient supply of gas is to be given at a reasonable price; and the installation of vertical retorts or stoking machinery in works where at present horizontal retorts and hand-charging are in vogue will probably have to be seriously considered in the near future.

The demand for gas for lighting purposes will, I think, continue to increase, and that for industrial purposes will be much greater; but the experience gained of its efficiency and economy in the metal and other industries must be made the most of, and every reasonable inducement offered to prospective consumers to adopt gas for their lighting, power, and heating requirements. By these means, a wider field and a more prosperous future for gas undertakings will be assured.

Mr. BROWNING, on the conclusion of the address, proposed a vote of thanks to the President, who, he said, had given them some valuable information. It was altogether a war address; and when

they referred back to it in times to come, the reading would be very instructive and interesting. This was the second time that Mr. Kenshole had taken the chair of the Institution. He was a very busy man; and they ought to feel grateful to him for stepping into the breach at such a time as the present.

Mr. A. J. WARD (Cardiff), who seconded, remarked that the President had covered practically the whole of the topics which concerned them more vitally to-day than they did in pre-war days. They would certainly, when they studied them, find the points he had raised most useful.

The PRESIDENT briefly acknowledged the vote, which was carried by acclamation.

REPORT OF THE SPECIAL PURPOSES SECTION.

The report submitted stated that there is now a total membership of 24. Six meetings have been held during the year, at which various matters were considered. The increase of 2s. 6d. per ton in the price of coal sanctioned by the order recently issued under the Coal Price (Limitation) Act, 1915, by the Board of Trade, was fully discussed; and the following resolution unanimously passed: "That a protest be sent against the increase of 2s. 6d. per ton in the price of coal made by the order of the Board of Trade under the Price of Coal (Limitation) Act, 1915; and that, unless it is altered, it will cause a great hardship on the local gas undertakings, necessitating an additional increase in the price of gas, and in the case of some local authority undertakings a call upon the rates." A letter was sent to the President of the Board of Trade enclosing a copy of the resolution and inquiring if there was any appeal from the order, and a reply was received in the negative. Classes for gas-fitters have been held in Cardiff, Newport, Swansea, and Pontypridd, which were well attended in view of the war. Examinations took place at all four places; and two passed in Grade I., twelve passed in Grade II., and nine passed in the Final, of whom eight obtained First Class. A. W. Halbert, of Cardiff, shared the second prize in all England given by the Society of British Gas Industries. The receipts for the year amounted to £18 18s., the payments to £28, showing a deficit of £9 2s. But after deducting this from the balance of £20 8s. brought forward, there remains a balance of £11 6s. in the hands of the Treasurer. The Committee are very satisfied with the work done during the year; and it is hoped more members will join during the coming year, which, it is felt, will be of undoubted benefit to themselves.

Mr. T. H. HAZELL (Newport) said the members had before them the report of the Special Purposes Section; and he thought he might safely say that the report spoke for itself. All those who had acted upon the Committee had felt that the past year had been more or less a strenuous time. Very often there were questions which, unless dealt with firmly and persistently, and carefully, might seriously affect the well-being, as they would certainly the revenues, of the undertakings represented. That the section was of value to the undertakings generally, must be freely admitted, if it were only for the knowledge acquired and imparted of methods of doing business, with a tendency to improve prices both for what they bought and for what they sold. Really, the section was a most valuable asset to the Institution. Take, for instance, the prices for coke. If each undertaking was standing on its own footing, many of them would be less acquainted with the possibility of obtaining higher prices than they were by associating together. They would all remember that a very short time ago coke was being amassed in the different yards, and was such a glut on the market that they did not know what to do with it. In some cases, even, small shrubs and trees were growing out of the coke-heaps; but it did not seem to be a great advantage to gas-works that they should encourage the growth of shrubbery by means of their coke. It was through the section that they received their first intimation of the improvement in the price of coke; and those who were wise availed themselves of the opportunity of making further inquiries, with, as it turned out, considerable advantage to their undertakings. But perhaps the most striking matter they had had to deal with during the past year was the question of coal. He had every sympathy with the condition of the coalfield in this district and in South Wales generally; and when, in addition to the huge prices that even under the Coal Prices (Limitation) Act the collieries were entitled to ask for, they came with another request for a modest 2s. 6d. on the top of the 4s., he felt things were looking very bad for the coalowners. They did not for a moment think that the Board of Trade would put 2s. 6d. on to the coal prices without making some inquiries at least of gas undertakings, as to what effect it would be likely to have on the domestic industries of this particular district. One would certainly have thought that, before acceding to a request of this kind, the Board would have instituted inquiries which would have led them very quickly to the knowledge that this 2s. 6d. could not be met by gas companies entirely out of their existing income, but that it would have eventually to be passed on to the poorer people of the neighbourhood. In many cases, it had placed undertakings in a very awkward and intricate position, inasmuch as they had to consider whether the time was not ripe for another addition to the price of gas. He knew the gas companies were as patriotic as most business communities. They certainly were a little more patriotic than the colliery owners, because they had not an outside field to stick higher prices on so as to recoup themselves for domestic supplies which they had to furnish at a lower price. But the position was that the gas undertakings had to pay the extra 2s. 6d., and they had to decide whether this should be borne by themselves for the present, in order to see how the accounts for the next half year would turn out, or whether the difference should be immediately passed on, as in every other business had been the case. Another matter which had presented difficulties was the question of the production of toluene. In this connection the position was rather a curious one with regard to the relationship between gas undertakings and the Board of Trade. They would know that pressure was put upon all gas-works to do their utmost to improve the output of toluene for the purpose of high explosives; and they must all feel unbounded satisfaction at the influence that the output of toluene had had in bringing about the good news of the last two days. [Applause.] He thought that gas undertakings should have credit for their share in making these great successes possible. But, concurrently, there had also come along a curious circular from the Board of Trade calling upon them to appeal to their customers to reduce the consumption of gas. On the one hand, they were asked to increase as much as possible their output of toluene; while, on the other, they were told in the interests of the country to do their utmost to reduce the output of gas. It reminded him rather of the perplexity of the boy who went to attend the christening of his two little baby sisters. When he came into the church, and saw the water in the font, he turned to his mother, and said: "Mother, which of them are you going to keep?" [Laughter.] They must have felt something of the same perplexity; but gas managers generally had found a solution of their own, and a solution which one hoped would be quite as satisfactory as that of the mother on the occasion he had referred to. He had much pleasure in moving the adoption of the report.

Mr. J. ROBB (Chepstow), who seconded, remarked that he would like to say a few words, not to the members of the section, but to the non-members. They had heard from the President's address, and from what Mr. Hazell had said, what the section were doing. Gas undertakings were meeting with difficulties from all quarters. They had keen competition; and they had also to face the formation of rings and combinations all over the country. He did not think himself that the gas industry was united in the way it should be to make its power felt. The Special Purposes Section was a beginning to enable them to claim their own. They had not been properly recognized in the past; and he did not know that they were even given sufficient credit for the important part they were playing in connection with the war. In fact, they were pretty much ignored in everything. They would have to unite more to meet their difficulties in the present than they had done in the past. As would be seen from the report, the expenses of the section had risen. If they were going to be a power and to make themselves felt, it was most important that those who were outside the section should come in. Therefore he made a most earnest appeal on behalf of the section to everyone who was not already a member to join at once. In the Institution itself, they could not, of course, deal with such questions as came before the section. By joining the section they would strengthen it, and enable it to present a united front.

The report was then adopted.

REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

The PRESIDENT said it afforded him pleasure to propose the appointment of Mr. Branson as their representative on the Council of the Institution of Gas Engineers for the year commencing in June, 1917. It was their custom to ask the retiring President to act for them in this capacity; and the only objection that could possibly be raised in the present instance was the removal of Mr. Branson from the district. He had, however, always taken a keen interest in the Institution, of which he was remaining a member; and when things became normal again, they would no doubt have him with them more often. It was therefore quite right that they should elect him.

Mr. H. D. MADDEN (Cardiff) seconded the proposition, which was agreed to.

DISTRIBUTION NOTES.

Mr. MADDEN then read a paper entitled "Distribution Notes," which, with the discussion following it, will be found on pp. 28.

The HON. SECRETARY, in proposing a hearty vote of thanks to the author, said he felt exceedingly grateful to him. He knew that whenever he was in a difficulty he could depend on Mr. Madden.

Mr. EVAN REES (Margam) seconded, remarking that he hoped they would have a further paper from the same source on this interesting part of gas-works routine. The points were many and varied; and each had been dealt with in a very concise manner, and in such a way as to afford the members plenty of food for reflection.

The vote was cordially passed.

PLACE OF NEXT MEETING.

On the proposition of Mr. JACKSON, it was agreed to leave the question of the place of next meeting to the Council to decide.

THANKS TO THE ABERDARE COUNCIL AND THE PRESIDENT.

A vote of thanks was passed to the Aberdare Urban District Council for the use of their room for the meeting, on the motion of the PRESIDENT, seconded by the HON. SECRETARY.

Proposed by Mr. HAZELL, and seconded by Mr. ROBB, the President was also thanked.

THE OIL-WASHING PROCESS.

The HON. SECRETARY remarked that Mr. Herbert Canning, of Newport, who was unable to be with them, had heard from the

Ministry of Munitions that they were anxious that those members who were in a position to do so should adopt the oil process of washing gas. Any information they desired on the subject they could get from Mr. Canning.

Luncheon.

The members then adjourned to the Masonic Hall, where they were the guests at luncheon of the Chairman and Directors of the Aberdare and Aberaman Consumers' Gas Company. Unfortunately, neither the Chairman (Mr. D. P. Davis, J.P.) nor the Vice-Chairman (Mr. Charles Kenshole) was able to be present to welcome the members; but Mr. Lewis N. Williams, J.P. (a Director) took the chair, and during the later proceedings he was joined by Mr. D. W. Jones, J.P., another member of the Board. The Loyal Toast was followed by a few short speeches.

Mr. Lewis Williams proposed the toast of "The Wales and Monmouthshire District Institution of Gas Engineers and Managers," and on behalf of the Aberdare Gas Company, his co-Directors, and himself, gave the members a cordial and hearty welcome to Aberdare. He said he appreciated the work and value of their conferences in the interest of the gas industry, and wished them continued success. He hoped that on some future occasion when they might again visit Aberdare he would not be left alone to welcome them on behalf of his Company. The absence of the Chairman and other Directors was, however, quite unavoidable; and no one regretted more than they themselves did that pressing business engagements prevented them from being present.

The President having in cordial terms responded to the toast,

Mr. T. H. Hazell proposed "The Chairman and Directors of the Aberdare Gas Company," coupled with the name of Mr. Lewis Williams, who had given them so excellent and sincere a welcome, and greeted them with such splendid hospitality. He said it gave him the greatest pleasure to associate himself with his fellow members in proposing the success and prosperity of the Company, and their great appreciation of the kindly and hospitable manner in which they had been received.

Mr. Lewis Williams suitably responded.

Mr. Hazell, again rising, said he felt he had not completed what he had to perform, and there was one more toast he would like to propose—Mr. Davey, the able and energetic Engineer and Manager of the Company. Mr. Davey was largely responsible for the excellent arrangements of that day, and the manner in which these had been carried out gave evidence of his capacity and the trouble he had taken, with the consent of his Directors, to make the meeting successful. He asked them to drink the health of Mr. Davey, with best wishes.

Mr. Davey thanked Mr. Hazell for his kind remarks, and the members for the hearty manner in which they had received the toast. He assured them that the part he had taken in the arrangements had afforded him the greatest pleasure.

At the Gas-Works.

Thereafter, the members proceeded by tram-car to the gas-works, the compact arrangement of which was commented upon. Here, after an inspection—made under the guidance of Mr. A. E. Davey, the Manager and Secretary—of the plant described below, the Company again gave substantial proof of their hospitality, by providing tea and light refreshments.

ABERDARE AND ABERAMAN GAS COMPANY.

The visit to the works proved to be unusually interesting, inasmuch as the members were able to see a good deal of new work both completed and under construction. These extensions have been called for by the growth which has of recent years taken place in the Company's business—or, rather, which was taking place until the outbreak of war disturbed the normal course of events. To show what the progress has been, it may be said that at the end of 1906, when Mr. Davey was appointed Engineer, the make of gas was at the rate of about 60 million cubic feet per annum; and by 1913 this had risen to 110 millions. At the present moment, the make is not quite so much, owing to the total cessation of public lighting and the restrictions under the Defence of the Realm Act. There were in 1907 about 200 prepayment meter users and from 1700 to 1800 ordinary consumers; while the figures now are 2600 slot-meters and about 2500 ordinary consumers. Thus the growth in the number of consumers has been even greater in proportion than the increase in consumption—a fact which is explained by the prepayment figures. There is still room for further business, seeing that the population of the Company's district is from 50,000 to 55,000, though there are obvious difficulties in the way of supplying many of the houses with gas.

Looking into the future and at the then existing condition of the works—which were not at all up to modern requirements—Mr. Davey on his appointment set himself to improve matters. A start had, however, been made by the conversion of one bench of direct-fired settings into the regenerative system. This was a bench of five beds of eight retorts in a bed, 22 in. by 16 in. by 10 ft., single enders. During 1907, a scheme was put in hand for the re-modelling of the retort-house. The large chimney-stack was first pulled down, and a new building was erected complete, with a further bench of eight beds of regenerative settings. The following year, a spiral-guided gasholder was put up by Messrs. R. & J. Dempster; the capacity being 360,000 cubic feet. Other improvements included a new meter-house, station-meter, and governors, and the enlargement of the works' connections from 10 and 12 inches to 16 inches. Following this, Messrs. R. & J. Dempster put up a pair of tower-scrubbers, 65 feet high and 9 feet diameter, of about 800,000 cubic feet per 24 hours capacity, together with a Livesey washer to correspond. The next step was to lay down a high-pressure installation at the works, with some 2½ miles of steel mains. Then last year the work was started of installing a Guest-Gibbons stoking machine, with coal discharging and conveying plant, together with a Strachan and Henshaw telpher arrangement for coke handling.

For the improvements in hand, the Company required further capital powers, which they obtained in the last session of Parliament; and at the same time they secured a further 2½ acres of land, making the total area of the site between 4½ and 5 acres, and thus allowing plenty of room for extensions. There is a private siding owned by the Powell-Duffryn Company which connects the works with the main lines of the Great Western and the Taff Vale Companies. Under the new scheme now in process of completion—which has, of course, been considerably delayed through the war—the coal-trucks will be brought into the works, and will be tilted by a hand-operated lifting apparatus, which will shoot the coal into an underground hopper, from which it will be passed by a push-plate conveyor into the coal-breaker, afterwards being taken up by a bucket elevator and conveyor which discharges it at various points for storage, when necessary, or places it on to two crossband conveyors in connection with the feeding hoppers in the retort-house, from which the charges are taken by the Guest-Gibbons stoking machine. Two of these hoppers have been installed, each of 15 tons capacity, so that there is overhead storage of 30 tons, or sufficient for about twelve hours' make at time of maximum output. As far as possible, of course, it is the intention to pass the coal direct from the trucks to the overhead hoppers, though there is ample provision for storage under cover. The coal-handling plant has been designed to deal with from 20 to 25 tons per hour.

With regard to the coke, this will be discharged from the retorts, through shoots in the side of the retort-house, into skips on the yard level below. It will be partly cooled by water sprays as it comes from the retorts; and then, when the skips have been picked up by the telpher, it will be immersed in a tank for final quenching, and dumped in the coke-yard or placed direct into trucks. In connection with this part of the scheme, it is also intended to provide two large overhead coke-bunkers, with a capacity of about 60 tons. These will be fitted with sliding doors, and erected in such a position that the railway trucks can be run underneath and loaded from them. These bunkers have been designed, too, in such a manner that they can be easily extended as opportunity offers.

At the entrance to the works, there is a foreman's office, with drawing-office, laboratory, and test-room upstairs; and near by is the new station-meter house, with a Parkinson and Cowan meter of a capacity of 1,000,000 cubic feet per 24 hours. In connection with the high-pressure installation, there is a high-pressure meter, also by Parkinson and Cowan, of a capacity of from 10,000 to 12,000 cubic feet per hour, by which the gas is measured at a pressure of some 90 inches. For compressing, there are two "National" gas-engines of 12½ h.p., with Keith compressors, both in duplicate, and each of a capacity of from 10,000 to 12,000 cubic feet per hour. The engines are direct coupled to the compressors, with flexible couplings; and Mr. Davey speaks well of their economy in working. Even when operating at half-load, he does not think that the engines have at any time exceeded a consumption of from 6 to 7 cubic feet per horse power per hour. The high-pressure installation serves the dual purpose of boosting into the low-pressure trunk mains and for high-pressure lighting. The system was put into operation in October, 1914; and there are about 80 Keith lamps, chiefly of 1000-candle power each, installed outside business premises. There is no doubt that, had it not been for the national crisis, a much larger number of these lamps would have been installed, as their use has been greatly appreciated, and they give general satisfaction. In the 2½ miles of steel main, there are two or three connections with the low-pressure mains, with automatic valve arrangements. When the pressure in the latter mains falls below 25-10ths, these valves come into operation, and boosting then commences.

In addition to the spiral holder of 350,000 cubic feet capacity, there are three other holders—two of 100,000 cubic feet each, and the third 150,000 cubic feet. There is thus storage capacity for 700,000 cubic feet in all. The works are well provided with carpenters', blacksmiths', and fitting shops; and there are adequate arrangements for the cleaning and re-assembling of cookers. There are two Clapham condensers, each of 250,000 cubic feet capacity per day; and two boilers, 18 ft. by 5 ft., fitted with Meldrum patent furnaces, provide all the steam required on the works. There are two sets—20,000 and 30,000 cubic feet per hour capacity respectively—of Waller four-blade steam-driven exhausters. Purification is carried out by means of oxide of iron entirely, in four boxes 16 feet square by 4 ft. 6 in. deep.

The installation of the Guest-Gibbons stoking machine in place of manual labour has, of course, necessitated the alteration of the single-ended retorts, and the placing of mouthpieces on both ends. The discharging side of the retort-house had also to be widened by about 7 ft. 6 in., so as to allow sufficient room for the changed method of working. Good accommodation is provided for the stokers engaged on the works. The ironwork, &c., is being provided by Messrs. Gibbons Bros. While on the subject of the retort-house, it may be mentioned that Mr. Davey uses South Wales bituminous coal, and finds the commoner sorts of this coal more economical, considered on the whole, than the expensive varieties. Year in year out, he has had an average make, with hand charging, of about 10,400 cubic feet per ton. Six-hour charges of

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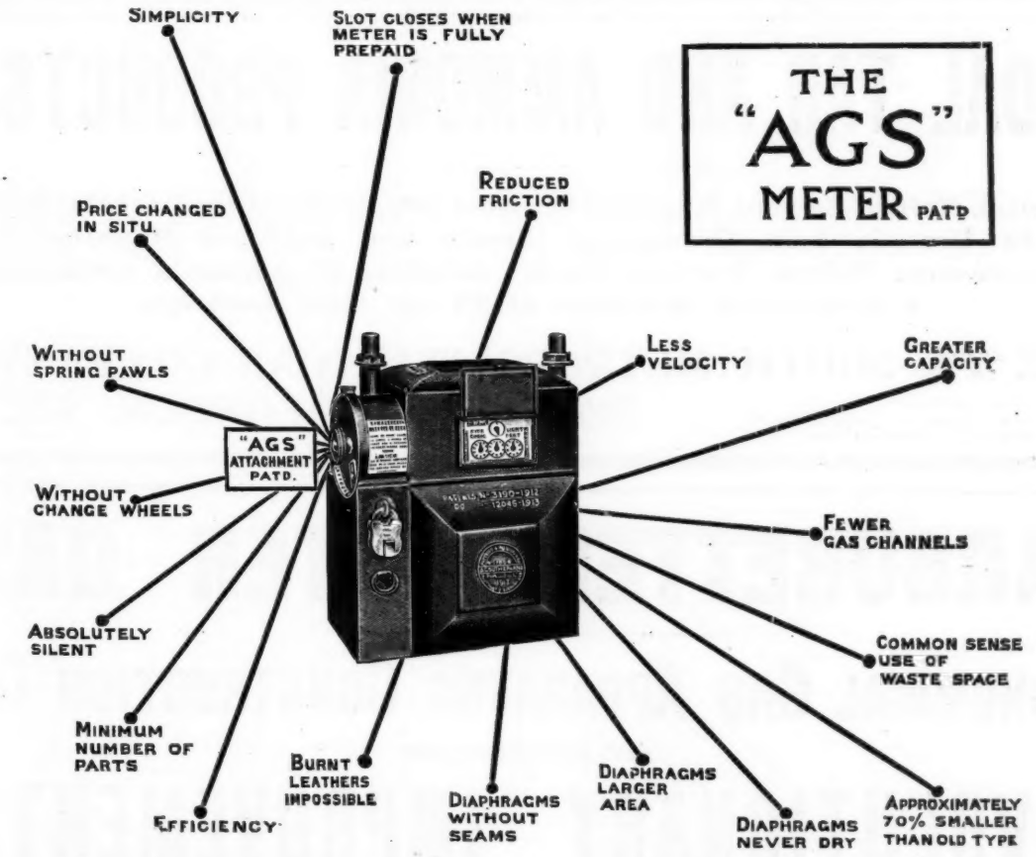

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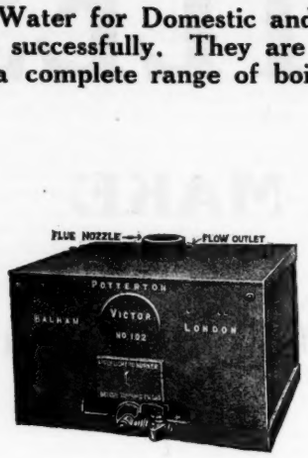

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A somewhat curious thing which may be seen in Aberdare at the present time is the collection of small coal by men who go round with small carts. The colliers, getting their supplies so readily, place no value on the small coal; and therefore these men go to their houses and pick it up, afterwards getting it sent away by truck loads. The Urban District Council generate the current for their tramways and electric lighting by power derived from the refuse destructor, for the reason just stated; their refuse being so rich with coal that there is very little need to buy any coal at all for steam-raising.

The Gas Company find keen competition in the municipally owned electric undertaking. The Council are supposed to charge a flat-rate of 4d. per unit; but so far as can be ascertained, it is very seldom they do business at this figure. There are many special contracts, by which most people seem to get their electricity at considerably less than 4d. As a matter of fact, the new plant at the gas-works, which has been described here, will be operated by electricity supplied by the Council at a price not exceeding 1d. per unit; the Company feeling that, while they could secure current at this price, it would not be worth while putting down their own generating plant.

The present price of gas is 4s. per 1000 cubic feet to ordinary consumers, with the addition of 10d. per 1000 feet to users of prepayment meters. This is a rise of 6d. as compared with pre-war prices. But while the consumers have thus been asked to pay 15 per cent. more for their gas, the Company have had, proportionately speaking, much heavier extra charges to meet. Coal has cost them about £5000 more, labour £1500 more, and other materials about £1500 more. This represents a total addition of some £8000 to the expenditure, whereas the 6d. rise in the price of gas will bring in only about £2000, or 25 per cent. of this amount.

From all that has been said here, it is clear that Mr. Davey has been having, and will at any rate for some while continue to have, a very busy time.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

In place of the usual autumn general meeting, a meeting was held by the Association last Thursday, at the Liverpool Street Hotel, London, for the transaction of purely formal business. At the opening of the proceedings, the RETIRING PRESIDENT (Mr. A. E. Broadberry, of Tottenham), was in the chair.

MINUTES CONFIRMED.

The HON. SECRETARY (Mr. F. M. Paternoster, of Felixstowe) read the minutes of the last meeting; and they were confirmed.

INDUCTION OF THE NEW PRESIDENT.

The RETIRING PRESIDENT thought that he might describe the principal reason for their meeting that afternoon as being the item on the *agenda* referring to the induction of the new President in the chair. Before he performed this pleasant duty, he should like to say, in regard to the year that had passed, that it had been a period of considerable trial and anxiety for all of them. He was sure that every one of the members had been doing his utmost for the country during the time. The calls upon the gas industry had been very great in regard to all sorts of matters connected with the war; and those in charge of gas-works had all patriotically stuck to their duty. Doing this had made it almost impossible to carry on the work of the Association in the way in which, otherwise, they would have desired to carry it on. As President, he had not been able to get to the meetings of the different Commercial Sections as he wished; and the meetings in town had been interfered with by the fact that each member had been anxious to be at his post so as to be ready to deal with any emergency that might arise from the attempts of the enemy to do harm. There was no doubt the Germans knew what a contribution the gas industry was making to the war. There was not the slightest doubt that, if the Zeppelins that came over here could manage to damage or destroy every gas-works in the United Kingdom, they would do it. But fortunately up to now they had not been able to do very much damage to gas-works or anything else. They had wasted a great deal of energy on, from the military point of view, futile work. But that was dealing with the past. What was to come in the future, none of them knew. But he was quite sure they all sincerely wished that Mr. Terrace (the incoming President), during his year of office, might have far better opportunities, and that the year might see the finish of the war, and the return of peace and blessing to the whole country—he might say, to the whole world. On behalf of the entire body of members, he bid Mr. Terrace, as President, a hearty welcome to the chair, and congratulated him very much indeed.

Mr. J. TERRACE (Grimsby) took the chair, amid hearty confirmation of the welcome extended to him by the retiring President.

The PRESIDENT, in taking the chair, said he wished first of all to thank his late chief and esteemed friend, Mr. Broadberry, for the kind words he had used in inducting him. He also desired to thank the members for being present that day. The meeting, of course, was only a formal one; and therefore the greater was the satisfaction to him to see such a large number there. The late President spoke about the past year, and made a few remarks as to the coming one. What next year had in store for them, none of them knew; and this made it very difficult indeed even to think about the amount of work that they would, individually and as an Association, take in hand during the coming year. He had, of course, hoped, and he was still hoping, that the next meeting of the Association would be held at the town of his adoption. He should like very much indeed, and he was sure his Chairman and Directors would be very pleased, to see all the members at the premier fishing port of the world. The fishing and allied industries, together with the new docks, &c., that they had in the district, he felt quite sure, would prove not only interesting, but instructive to a large number of the members. Whether they would be able to meet there depended, of course, upon the state of the war. As to his presidency, those who knew him best would not expect from him any great flights of oratory. He much preferred to remain seated for a great deal longer than he cared to stand on his feet to speak. However, he could assure the members that, having taken the office of President, he should do his very best to carry out the duties with credit to the Association, and to the satisfaction of all the members.

THE PRESIDENT'S MEDAL.

The PRESIDENT (proceeding) said he had next a very pleasant duty to perform, and that was to present Mr. Broadberry, on vacating the chair, with the President's Medal as a memento of his year of office. It gave him a great deal of satisfaction to do this. He knew full well that the work which it had fallen to the lot of their late President during the past year had not been of the pleasant nature that he would have desired it to be; and he (the President) was sure the members all felt that he was right in expressing the opinion that they were very greatly indebted to Mr. Broadberry for his unfailing kindness, courtesy, and attention to the business of the Association during the year.

Mr. BROADBERRY said, in acknowledging as Past-President the receipt of the handsome medal, he felt he ought to say almost all over again what he had just said about the difficulties of the past year, as some sort of excuse for the shortcomings he felt had been practically forced upon him by the circumstances of the year. He thanked the members very much for the medal, which he should retain and prize, he hoped, for many years to come; and while he should look upon it as a token in some ways of a very pleasant year, he should try at the same time to forget the less pleasant part that had been connected with the war. He hoped he might for many years to come be able to meet the members; and, in wearing the medal, remind them, as well as himself, that during the year just closed he had held the honourable position of their President.

DISTRICT REPRESENTATIVE ON THE INSTITUTION COUNCIL.

Mr. W. B. FARQUHAR (Ilford) said the next business was to elect a District Representative on the Council of the Institution; and they could not do better than follow the ordinary custom of asking their President to occupy the position. It would refresh the memories of the members if he just mentioned that he (Mr. Farquhar) was appointed their representative on the Council for a second year (the year following his office as President of the Association), as Mr. Broadberry was already a member of the Council. His term finished with the Institution meeting next summer; and from that time, he proposed that Mr. Terrace take up the office.

Mr. JOSEPH DAVIS (Gravesend) seconded the motion, which was heartily passed.

The PRESIDENT thanked the members.

PLACE OF NEXT MEETING.

The PRESIDENT remarked that the next business was to consider the place of next meeting. Since he knew that he was to be President of the Association, he had looked forward to seeing the members at his own works and in his own town. Whether they would be able to give effect to this hope depended altogether on circumstances beyond their control. He would therefore suggest that they adopt the usual procedure of leaving the place of meeting to be fixed by the Committee as circumstances allowed.

Mr. DAVIS thought this was the proper course to take; and he seconded the proposal with pleasure.

The motion was adopted.

VOTE OF THANKS.

Mr. JOHN BARTON (Peterborough) moved a vote of thanks to the President and officers for their services during the past year. The members would agree with him that they could not thank their President enough for the work he had done for the Association. He had done a very great deal; and they were all aware he had put in a vast amount of work for the Ministry of Munitions. Their thanks were also due to the officers; they had worked very well. He hoped that before long they would be able to meet under circumstances more agreeable.

Mr. W. TOWNSEND (Colchester), in seconding, remarked that Mr. Broadberry had already told them that he considered it an honour to have been President of the Association. The members of the Association considered it an honour to have had him as their President, particularly as he was now in office as the head

of the gas engineers of the United Kingdom. While on his feet, he should like to say that, in arranging the next meeting, if it were not possible to go to Grimsby, they should endeavour to have some kind of programme. If it was not possible to have a Presidential Address and cut-and-dried papers to discuss when meeting together in these times, they might have a discussion on subjects that were on all their minds, and special to this period of anxiety and difficulty. He did not think it right that men should travel many miles to meet together, and merely transact purely formal business and pass votes of thanks.

The motion was heartily agreed to.

Mr. BROADBERRY acknowledged the vote on behalf of himself and the officers generally. He added that he would like to take the opportunity of saying how very much indebted he personally was to their Hon. Secretary and Treasurer (Mr. Paternoster), as well as to the members of the Committee. But to Mr. Paternoster in particular, he was indebted for the great pains he had taken on every occasion to make sure that everything should go along in a smooth and pleasant manner for himself and for the members. Without his help, the past year, he was afraid, would have been a singularly flat one for the Association; and whatever thanks the members thought were due to him (Mr. Broadberry) as President, he could assure them were due to Mr. Paternoster for the indefatigible way he had always tried to keep him up to the mark.

Mr. PATERNOSTER was also called upon to reply. He observed that he had been thanked very much for what he had done; but the year had not been a particularly strenuous one. They had only one meeting, and that was at Tottenham. On this occasion, he thought Mr. Broadberry did all the work. But his own work as Hon. Secretary went on for ever; and there was a great deal of correspondence to attend to. He was only too anxious to do his best for the Association.

Two Departed Members.

The HON. SECRETARY announced that since the last meeting he had been informed of the deaths of two members of the Association—Mr. W. C. Dawson, of Nottingham (associate), and Mr. J. A. Young, of Louth (member). Mr. Young died in January—before their last meeting; but the first intimation he had of it was when he applied for Mr. Young's subscription. At the last Committee meeting, he was instructed to write to Mrs. Dawson, and had done so.

Mr. DAVIS moved that a vote of sympathy be passed with the relatives of Mr. Young.

Mr. FARQUHAR seconded the motion, which was passed.

UTILIZATION OF GAS FUEL APPLIANCES.

One of the items of business to be considered at the eleventh annual meeting of the American Gas Institute, in Chicago, on the 17th to the 20th inst., will be a report of the Committee on the Utilization of Gas Fuel Appliances," who will recommend that an agreement be reached between the National Commercial Gas Association and the American Gas Institute, whereby standard specifications for gas-ranges and gas-fixtures, which have already been jointly adopted by these two Associations, be printed under titles which so state this fact.

They then proceed to urge that the imposition of ever stricter requirements by fire prevention authorities, and a proper regard for the essential interests of the industry, call for the production of a flexible tubing which shall be substantially as safe as a rigid metal pipe. The tentative specification they will submit they believe will describe a tubing to meet these requirements.

Their position in regard to slip joints is no different from that taken several years ago, and they believe a substitute joint should be found. However, even if a practicable substitute were now obtainable, a considerable period of transition must elapse, and the slip joint will continue to exist for a number of years. For this reason it seems worth while to standardize the slip end; and they will submit the "perfected joint" designed by the Appliance Committee of the National Commercial Gas Association.

Gratifying progress has, they state, been made in the development of a safety joint to take the place of the slip joint; and the design to be submitted has been tried with satisfactory results. The joint cannot be accidentally pulled apart; and after it has once been screwed together by the fingers, it is as safe from unintentional rupture as is an iron pipe thread-joint.

Several factors combine to bring the use of gas for industrial purposes into great prominence and to warrant an increase of attention to this class of business. This industrial work, they say, is a special branch of the gas business, and requires the services of skilled, experienced engineers. Manufacturers of appliances using competitive fuels are expending large sums of money in their development; and it is imperative that the gas industry should not lose sight of this fact.

The tendency of some appliances to get out of adjustment—particularly where a number of appliances, with individual operators, are grouped in one or more rooms—has caused the use of gas, in some cases, to be criticized by local health authorities. Gas men are advised to investigate the several systems now on the market in which a perfect premixture is made and delivered to the burners, thus ensuring continued perfect combustion.

The Committee believe there is need for further development in America of gas fireplace heaters of the radiant fire type, and trust that such development may be advanced.

DISTRIBUTION NOTES.

By H. D. MADDEN, of Cardiff.

[From a Paper read before the Wales and Monmouthshire District Gas Institution, Sept. 27.]

The subject of distribution is a very wide realm, owing to the strides that have been made in the application of gas for lighting, fuel, and power; and with the active propaganda work of the British Commercial Gas Association, new fields will unquestionably be developed as time goes on. We must, therefore, be prepared to meet all new demands; and though the distribution system is out of sight, it should receive as much care and forethought as that given (say) to carbonizing.

A general distributing practice much in vogue some few years ago was to carry cast-iron mains from the station-governors, gradually reducing in size as they reached the outskirts of the area of supply—much, in fact, like the skeleton of a leaf. Services were fixed on at one and all parts of the system. Under to-day's requirements, trunk mains and feeders and service-mains all have their place and functions, and especially are these becoming necessary in dealing with peak-loads—as, for instance, the cooking-load on Midsummer Sundays, from 11 a.m. to 1.30 p.m., wherein volume is of the utmost importance. Speaking from memory, the distribution of the City of Brussels is laid down on such lines. Trunk mains (fed by Rateau booster fans) make complete circuits of the city; feeding mains branching away in regular areas to keep the service-mains supplied with the necessary and regular volume and pressure during all variations of the load demands.

Volume and Pressure.

Fans driven by turbines are being increasingly employed to transmit large volumes of gas from one point to another; but the ranges of pressure available are, generally speaking, not of such a character as to class the plant among the high-pressure ones. During the periods of peak-loads, the services of turbo-driven fans are invaluable in supplying with the requisite volumes the ordinary works governors or else the distributing governors that are situated at a distance from the gasholder.

Turbo-driven fans have a great range of flexibility in the addition to, or reduction of, pressure requirements; but it is necessary to add that two fans cannot efficiently work in parallel, taking gas from the same inlet main and delivering into the same common outlet main, unless some provision is made to counteract the loss of output due to slip. In our own case at Grangetown, where two half-a-million-per-hour fans are in operation, a parting valve is fixed between the two on the 30-inch outlet main; one fan delivering to the left-side inlet to the governors, and the other to the right-side inlet.

High-Pressure Plants

The use and application of high-pressure gas is now a matter of such importance that it carries a field of possibilities for its development, &c. New problems have been introduced in the method of compression and distribution. Rotary compressors, gas-engine driven, have been largely installed to raise the pressure from inches to pounds; and supplementary high-pressure mains of steel have been largely employed for distributing purposes. Long lengths of tube are used, and the number of joints commensurately reduced as against cast-iron pipes—a factor not to be ignored. At the same time, experience indicates that, with the ever-increasing weights of the rolling street traffic, it is advisable to minimize vibration by keeping the pipes well below the road surface, or else seek a line for them in the footpath.

The coating employed against corrosion in the soil must be intact when the pipe is laid, and each length carefully inspected and bandaged where necessary. I have seen coated pipes after being in the ground for about six years, and the gloss on the bitumen solution was as bright as the day when the pipe was laid down. It must also be remembered that, in the action of compression, the temperature of the gas is raised; and a method of proper relief to prevent churning is desirable, when the compressor is not delivering to its full capacity.

High-pressure service-pipes, properly coated and protected, are advisable—and, in fact, the coating of all service-pipes below ground with a protecting material is an investment that more than compensates for its initial cost, by reason of the greatly lengthened lifetime and the less chance of undue corrosion, with the insidious and protracted leakage. I may say that for some years past we have taken steps to protect service-pipes in this way; and I am sure it is in the long run an economy of no small importance. High-pressure systems of compressors and steel tubes, with lead wool or welded joints, are now often employed solely to re-enforce outlying district mains; the necessary reduction of pressures being made by interposing reducing governors. In other cases, where a high-pressure system has been introduced for lighting purposes, if necessary it can be utilized in the same manner for re-enforcing the volume at needful points in the ordinary system of distribution.

In our own case, a compressing plant for lighting was introduced a few years ago in the distributing-room at the Bute Terrace works, which is, as you know, situated in close proximity to the town centre. Steel tubes now radiate through the chief streets of the city, and to shopping areas some distance away; and at three different points, 6-inch Reynolds governors in under-

ground pits have been established, whereby the high-pressure system is utilized to feed into the ordinary trunk mains and feeders during the peak-load periods. By this arrangement, the value of the high-pressure system of distribution is developed, and it becomes a useful auxiliary to the ordinary distribution system. At the time when the primary system was installed, several members of the Institution inquired the reason why we had used tubes of 8, 6, and 4 inches diameter; but one feels that their adoption in the early stage has been justified, inasmuch as two 50,000 cubic feet per hour compressors are now being added to the equipment of this compressing plant.

Service Work.

Too much care cannot be exercised in the laying of service-pipes. With every service, a good number of screwed joints occur; and if these are not thoroughly secured and tested, opportunity for slight leakages occurs. Taking into consideration the number of services and the corresponding number of joints on the distribution system of a gas company, it means a big item in the sum total.

In a foregoing paragraph, mention was made of some form of protective coating for service-pipes; and I am sure this course is fully warranted by the lengthened life of the pipe and the safeguard against corrosion and consequent leakage that may occur. In poor soils, this is a clear duty to the efficiency of the pipe-system.

The internal efficiency of the distribution system requires care, if good service to the consumer is to be provided. Naphthalene deposits in street mains and services are, or should be, a thing of the past, as the efficiency of a light solvent properly applied at the inlet of the governors not only cures the naphthalene trouble, but at the same time lightly coats the interior of the pipes with an oily film which does much to prevent internal corrosion of wrought iron or steel service-pipes.

In cutting and screwing lengths for service work, the interior of the pieces should always be examined for "burrs." I have come across cases where a "burr" has been formed of a most retarding character to the proper flow of gas.

Leakage Location.

The regular and periodic inspection of trunk-main lines is, to my mind, a very necessary practice. Bar-holes and the use of the leakage indicator at intervals along routes traversed with large mains soon show the presence of gas; and leakage that may be of such a nature as to be unnoticed for years can be found and remedied. It is surprising how long minute escapes may remain undetected, unless searched for and hunted-down. To this end, the assistance of the syphon-pumpers may be co-ordinated in intelligently noting the main routes they so regularly traverse to attend syphons, &c.

Openings in ground by other authorities can be inspected, and results noted. Roads where heavy steam-rollers are at work should be reported on by them, together with any other information they may glean from sewer, culvert, and other repairers on the road, so that the slightest indications of the presence of gas may be noted and ultimately dealt with. A practice we have established is that in every case where ground is opened to lay or relay a service-pipe, a bar-test is made to the left and right of the main; and many instances of leaky joints have been brought to light through this procedure.

The mining districts of South Wales afford distribution problems of a very difficult nature; and the worst is the experience brought about by subsidence. I have recollection of one particular problem, where the ultimate remedy was the laying of a new steel trunk main from the works to a township some 3 miles distant. Opportunity was taken of this to make the pathway of the new main as near as possible to the old one, so that the pipe-joints and service-connections on the latter could be examined *en route*. After completing the job, the unaccounted-for gas was so materially reduced that the additional work incurred was more than amply repaid.

DISCUSSION.

The President (Mr. J. E. Kenshole, of Merthyr Tydfil), remarked that they had had a useful paper; and he hoped the members would discuss it well.

Mr. F. Shewring (Tawe Valley) said Mr. Madden mentioned the use of coated service-pipes in connection with high-pressure supplies. Perhaps he would kindly tell them what system of coating he adopted. He (the speaker) had himself had to deal with this matter some years ago at Droitwich, where they had considerable trouble with acidity of the soil, due to percolation of brine from the brine streams and from the canal, in certain streets of the town. It was quite a common occurrence to have a service-pipe completely oxidized and rusted in from twelve to eighteen months. But perhaps the bigger trouble was not so much having to renew the service-pipe, as that, owing to the oxidation of the pipes, when the water in the canal in the vicinity rose to a certain level, it would get above the main and block it. With a hole about the size of a pea, the water would block the main in a night; and they would appreciate the difficulty of finding such a hole in a service-pipe in a street of some length. It had occurred to him at the time that if he adopted such a method as Mr. Madden had mentioned in his paper, it would be a very good thing; and he therefore, as a commencement, took to coating all the pipes with a tar solution when they were laid. He applied hot boiled tar, mixed with ground lime to thicken it, wrapped the pipe thoroughly in jute cloth, and afterwards re-coated it with the same solution. He found there was a great improvement in the life of the pipe; but at the same time he would advise managers when troubled in this respect to take into consideration the character of the soil—what the acidity of it might be due to. The matter should be then dealt with from a chemical standpoint, because some acids would attack solutions in different forms; and without this knowledge of the soil it might take some time to hit upon the best solution. Subsequently, he got the makers to coat the pipes for him; and they did it on similar lines to Dr. Angus's method. There was, however, one thing here about which he had found it necessary to be very careful. Sometimes there was carelessness in dipping the pipes and getting the solution in the interior—with a consequent restriction of the gas supply or an entire blockage through the melting of the solution inside. It was therefore always advisable to specify that the pipes should be capped at each end before being dipped and coated. Then when pipes had been coated there was another thing that required attention. They might not be altogether even—that was to say, the coat might be lumpy. This did not, of course, matter in an ordinary case; but in laying services in places where fine adjustment of level was called for, there might be trouble if care were not exercised. They would all agree that the author's remarks on the location of leakage were very important. He himself thought much of the leakage was on services, which required a large amount of supervision. It was often difficult to get men to see the importance of testing their joints and also testing syphons. He had found many leakages there with soap solution, when the torch had failed to reveal anything wrong at all. Reference was made in the paper to the fact that Brussels was supplied with gas by means of trunk mains making a complete circuit of the city. Those of them who were familar with Brussels would recognize that it was an admirable place for this type of supply, being somewhat circular, with the streets radiating from the centre, much on the lines of Paris; but they would have very great difficulty in carrying out any such arrangement in the valleys of South Wales.

Mr. W. C. Jackson (Neath) remarked that Mr. Madden had very rightly pointed out the necessity for greater care of services than had been exercised in the past. He had himself lately come across a case of a service laid down in tipping, and the clinker had attacked the pipes. One he had seen taken out the previous day was corroded quite through. He thought this was a point they would have to further consider—especially as the pressures they were dealing with nowadays were on the increase, and were likely to go on increasing. His experience was something like that Mr. Shewring had related. That was to say, he was having difficulty just now in locating a water leakage into a main. He quite expected to find that it had come from a service-pipe with a hole in it, but so far he had been unable to fix upon the exact spot, though he had got within a certain distance of it. If any treating of service-pipes would save such a job as he was on now, it was worth while adopting. It had taken him and a couple of men the best part of a fortnight to get the trouble so far located. The question of boosting gas was certainly important; and anyone who has seen the plant at Cardiff must have felt that it was splendidly laid out and met the requirements particularly well. In the smaller works, of course, these things were not so widely adopted; but it was a method which some of them would have to consider in the near future, for the purpose of supplying their out-districts. He had in mind two areas in his own case which were insufficiently supplied during the time of maximum demand in the town; and something of the sort would have to be done for them as soon as things settled down again.

Mr. Evan Rees (Margam) said the subject dealt with by the author was one which very often did not get the amount of attention it deserved, more particularly, perhaps, from men controlling small undertakings. The question of distribution was, of course, specially important in mining districts. He had had one or two unfortunate experiences in the matter of gas distribution in a rather difficult mining area; and he was glad to find Mr. Madden again coming to them with the watchword "Efficiency," more particularly in regard to constant volume and pressure. Occasions had been numerous on which they had heard Mr. Madden give very solid reasons why special attention should be paid to this. It was an essential which could not be properly attended to, whether their plant was small or large, unless they gave the question of distribution the amount of consideration that it really deserved. The subject of boosting gas did not apply to the majority of the members, because their works ranged from 30 to 120 million cubic feet a year. In Cardiff they made more gas in a day than some of them produced in a week. Nevertheless, Mr. Madden in his notes showed them once again the efficiency of boosting in order to maintain the volume which was absolutely essential for good service at the time of peak load. The question of leakage location was the only one that particularly attracted him personally; and he would like to say that perhaps the steel main that the author had referred to was laid between Blaina, in Monmouthshire, and Brynmawr, in Breconshire. At that time, it was really a case of "Hobson's choice." There was a town that the Company had to supply with gas; and for thirty years they had failed to do it efficiently. There was a small main; and it passed through a district which was heavily worked from a mining standpoint, with the result that it was quite a common occurrence to be knocked up in the middle of the night and told that the holder was quickly disappearing—the reason being that

the main was cracked. The leakage account of the Company stood at something like 32 per cent.; so members could imagine the proposition they were up-against. The work undertaken to locate leakage systematically and the laying of the new main were the means of reducing the leakage to 16 per cent.; and for a considerable period it remained at this figure, which was the lowest percentage over the country for works operating in a mining district. It was "donkey work;" and it must be done, if efficiency was to be maintained from day to day. If they were to give the service which all gas suppliers were expected to give by an often-times critical public, the work of distribution must receive the same amount of attention as was given to the retort-house. Personally, he felt very much indebted to Mr. Madden; and he thought it would not be at all a bad idea if he were asked to continue this subject on perhaps a more comprehensive scale at a meeting of the Institution some time next year.

Mr. A. E. DAVEY (Aberdare) said the paper had been particularly interesting to him, from the fact that his own system of distribution had been remodelled very largely on the lines set out by Mr. Madden. Being in a mining district, they had a heavy leakage; and the problem was to get sufficient pressure to satisfactorily supply the low-lying area, as well as the higher parts. The trunk main ran from the works right through the town; and they found it difficult to get a generous supply to the other end of the district, because of the severe drain on the trunk main at times of maximum demand. Coupled with this fact, they had a great number of mains which really were too small to meet the requirements. There was a network of wrought-iron mains of from 1 to 2 inches diameter; and, of course, they were a constant source of trouble. All these he had taken up; and he had made it a very strict rule that nothing less than a 3-inch main should go down to supply even a few houses. They found, getting a larger volume like this, that they were able to carry on business much better at a lower pressure at the initial point of supply. At some places, it was still difficult to get what he considered a full supply; but they were certainly doing very much better than before. In 1914, the Company felt that the demand for gas was increasing to such an extent that something would have to be done in order to add to the supply. The trunk main was really too small; and so as to overcome this difficulty without enlarging the main, it was decided to adopt a system of high pressure. By this means, they had been able to offer facilities which he believed had given very general satisfaction. The high-pressure lighting had been well taken up for business premises; and its use would have grown even more rapidly had circumstances been propitious. In addition, too, to supplying a large number of shops, the high-pressure main was connected (with valves) at two points in the town with the low-pressure system; and directly the pressure fell below 25-10ths in the ordinary main, the two valves automatically operated and supplied gas from the high-pressure system. Thus the pressure in the trunk main through the town was maintained at a minimum of 25-10ths, though, of course, it was at certain times more. In this way, the Company were able to give a very good supply of gas; and the scheme had also had the effect of considerably reducing the leakage account, which, in the first place, was well over 20 per cent. But, of course, being in a colliery district, they had a good deal of made-ground through which the pipes passed; and so there was considerable trouble through deterioration and subsidences. These matters were, however, receiving their constant attention.

The PRESIDENT remarked that it was as true to-day as ever it was that dividends were made in the retort-house; and it was quite as true that they might be lost on the district. Mr. Madden had more particularly referred to mains and services; but he (the President) did not think that these anything like covered "distribution notes." Certainly, they did not cover the leakage account. He had gone into the matter from time to time, and found a lot of leakage was accounted for by the public lamps over-burning [Laughter]. This was a great source of leakage. Meters were another thing. He distinctly remembered the case of a meter supplying a good sized building, where it was afterwards determined to put in some check meters over the premises. When at the end of the quarter they came to compare the consumption through the check meters and the consumption through the main meter, there was a very considerable difference. The check meters showed a much greater consumption. They had the meter out, tested it, and found that it was registering slow. When one came to have a meter of 500, 600, or 1000 lights, it was surprising what a number of bye-passes could be kept going without the meter registering anything at all. The valves had to be in particularly good condition to register the small quantities of gas so passed. The diaphragms, too, being skins, were porous; and unless they were well oiled, a lot would go through them. However, in this instance they got the valves attended to, and found a considerable improvement. But even then the check meter showed a bigger consumption than the main meter. They then decided to put in a wet meter; and this told the tale. There was here a positive registration; and the main meter thereupon registered more than the check meters. This proved to them that, although dry meters had reached a considerable state of perfection, they were not exactly the thing yet. Mr. Madden told them that he had taken out some coated pipes, and the bitumen was in perfect condition after the pipes had been in some half-dozen years or more. He himself had taken up some cast-iron mains that had been down for something over 25 years, and the coating on them was almost as good as on the day they were laid. This, of course, depended upon the nature of the soil. Probably the soil where Mr. Madden took out his piping was of a clayey character—one of the best that could be had for pipes. But had he had any experience of these coated pipes when laid in ashes or acid soil? If so, he would like to hear how they answered under these conditions. Then the author referred to naphthalene deposits, and said they should be a thing of the past. He (the President) had, however, not quite got to this stage yet. He had tried a vaporizer, and still occasionally got a little—though it was only a very little—on the district. On the subject of trunk mains, which had been referred to by some of the speakers, he might mention that he had an 8-inch diameter main supplying a district two or three miles down the valley. It had been laid a good time; and he doubted very much if they were to open it right up whether they would find a whole length of pipe anywhere. There had been leakages all along it. But the system that was adopted here was a very good one; and they managed to keep their unaccounted-for gas at a comparatively low figure. Puddle clay was applied to every joint. He had been present when an opening was made, and there had not been the slightest trace of gas through the clay; but a split socket had been found on further investigation. The plan was still followed on this particular main. They had put in so many short pieces that, as he had said, he did not believe there was a full length of pipe the whole of the way. It was intended to re-lay the main shortly; but the ground was pit-shale and blast-furnace slag, and before putting down a steel main coated he wanted to know what the action was likely to be upon it. He must be assured that it was going to last. Of course, they knew cast iron would go on all right. For consumers' services they had made it a point to use nothing but steam tubing. He thought the slight extra cost of this was well repaid.

Mr. MADDEN, in reply, explained that his object in presenting the notes had been to raise a discussion. He was glad to hear what the President had said as to the efficiency of clay against leakage. As to steam tubing for services, he thought this practice was being more developed day by day. When alluding to naphthalene as being a thing of the past, he was, perhaps, speaking personally. At Cardiff they had not been troubled since they put in some apparatus of their own, which did its work quite efficiently. He believed he was right in saying they had not had a single complaint for some five years. It appeared, therefore, as though the problem could be pretty well mastered. He could not throw any light upon the question of what would happen to coated steel pipes laid in ashes. Time alone would show how long they would last after they had been given the best protection possible. Mr. Shewring had told them of some problems with which he had been faced in the brine district of Droitwich. It was easy to understand what he must have gone through there, trying one thing and another. Had he ever tried V channels? Some time ago, in the Chelsea district of London, he (Mr. Madden) saw a service in a V-shaped channel filled up with pitch, and the service-layer said that it had been there for seventy years. Of course, the ground was very good; but there was the pipe, as good as the day it was put in. It occurred to him that this might have met the case at Droitwich.

Mr. SHEWRING said he tried laying the pipes in this way; but with water-logged ground there was difficulty with the pitch.

Mr. MADDEN (continuing) said he quite agreed with Mr. Jackson that the nature of the ground must be taken into consideration. They must have regard to the chemical view of the matter before deciding upon a remedy. He was glad to see he had drawn Mr. Rees out about the Blaina main, for he knew what he had gone through. Further, he was pleased Mr. Rees had given the figure to which his leakage had been reduced. It was his own suggestion that the new main should be put in the same channel as the old. Mr. Davey had done the right thing in laying down a law to himself for a minimum sized main. This was a point which everyone would have to take into consideration. The size should be governed not only by the amount of gas going through, but by the load of traffic about. It was no use putting small mains where there was a 15-ton steam-roller going about. Strength was wanted there. Each one would have to fix upon a size to meet his own particular requirements.

Low-Compression for Diesel Engines.—In the course of the recent meeting of the British Association, Professor W. H. Watkinson described some experiments on the possibility of working Diesel engines with low compression-pressures. It has, he said, hitherto been believed that with Diesel engines a compression-pressure of 460 to 500 lbs. per square inch is necessary to effect self-ignition of the oil sprayed into the compressed air; and in consequence of the high pressures developed during starting, and of those liable to be developed under certain normal conditions, it is necessary to make various parts of the engines much stronger than would be required for the normal maximum working pressure. Thus the engines are heavier and more costly per unit of power than other types of internal combustion engines. To avoid the very high pressures attained during the starting of Diesel engines, it is only necessary to throw out of action the mechanism operating the air-admission valve. The spring on the valve-spindle will then automatically control the wire-drawing of the air admitted to the cylinder; and the maximum explosion pressure for starting will be limited to about the normal compression-pressure, instead of being 800 lbs. per square inch or more.

MANUFACTURED GAS FOR HOUSE HEATING.

By Geo. S. Barrows and C. C. Winterstein.

[Abstract of a Paper to be Submitted to the American Gas Institute, Chicago Meeting, Oct. 17-20.]

When the Chairman of the Papers Committee requested the preparation of this paper, he expressed the hope that it would not include "the usual statement that the price of gas prevents its use for general house heating." This request seems to indicate that such a statement has been made an excuse for an infrequent use of gas as fuel for house-heating purposes. The authors propose to ascertain the validity of such an excuse by a discussion of the theoretical aspects rather than by a consideration of the practical appliances, the design of which, with present-day knowledge of combustion and heat transference, should be relatively simple, once one is sure of the fundamental principles.

Treating the subject in this manner, it is not enough to speak of gas alone; for the result desired by the consumer is heat, and all means for obtaining it must be considered. Current literature on the subject of house heating indicates but little careful study of the use of manufactured gas for the purpose; and it appears as if it is categorically assumed that it is out of the question. For this trend of opinion gas men may be to blame for insufficient publicity, as is indicated by a recent edition of a handbook on "Heating and Ventilation," in which the author has found it pertinent to add a short chapter on electrical heating, and has made an approximate computation of the relative costs of electrical and coal heating. No similar comment, however, is to be found regarding the relative costs of gas and coal heating; and the thought naturally arises as to what the motive could have been impelling this authority to span the breech between these two widely different methods of house heating while entirely ignoring gas as a fuel. It would seem that the electrical industry, despite obvious obstacles, has been able to demand a hearing in the consideration of this topic, while the more logical fuel "gas" (manufactured gas in particular) has failed to make any very deep impression.

Kinds of Fuel under Consideration.—Manufactured gas, anthracite coal, bituminous coal, coke, oil, wood, district heating, and electricity.

Means for Distributing the Heat.—Central heating, hot air, hot water, steam.

Individual Room Heating.—By fireplaces, stoves, which may be portable or stationary.

The mechanical factors which govern the choice of fuel or heater are: (1) Space occupied by the heater and its accessories for distributing the heat. (2) Materials of construction viewed not only from the standpoint of first cost but from simplicity of installation and repairs, and durability. (3) Operation, including manual or automatic supply of fuel, and manual or automatic control or regulation of temperature.

Assuming that a heater and its accessories can be properly made and installed, it should not meet with approval without assurance of reliability and safety as affected by construction and operation, both of which involve, among other things, fire or other hazard. There is also the question of fuel supply, which may be affected by strikes or interference with transportation.

Reviewing these factors which enter into the selection of a heating system, the authors find that all should be considered no matter what the fuel may be; so for their purpose, while discussing all of them, they compare the fuels *per se:*

Selection of Fuel is Governed by Cost, Convenience, Cleanliness.

Cost includes:
1. Investment and interest thereon.
2. Maintenance (depreciation and repairs).
3. Thermal efficiency (cost per useful B.Th.U.).
4. Labour (all operating labour).
5. Insurance.

Convenience includes:
1. Reliability of supply (transportation, storage, safety).
2. Ease of handling.
3. Control (temperature regulation).
4. Character of heat.

Cleanliness is affected by:
1. Fuel before use.
2. Fuel residue and products of combustion.
3. Control of dust-laden air in the rooms heated.

Summarizing the factors entering into the selection of fuel—using as the base for comparison manufactured gas in those cases where the uses of fuels are fairly comparable and neglecting fuel cost—we have the figures shown in the table [second column]. From which one sees that gas is more desirable than any other heating medium (fuel) except district heating and electricity.

Discussing the three methods principally in use to-day for heating buildings from a central heating plant—namely, hot air, hot water, and steam—the authors find that any fuel is applicable except electricity; and the efficiency of the system will only differ with the difference in the fuel.

Comparing the efficiency of coal and gas, the authors feel they are justified in assuming that the heat loss by radiation from the heater and its connections is approximately the same. The unavailable heat in the coal-operated apparatus will be represented by stack losses and the unburnt fuel loss, while in the case of the gas-operated apparatus it will be represented by the stack losses only. The fundamental purpose of a stack with the coal-operated appliance is to create a sufficient draught to draw in the necessary air for combustion. In the case of gas, the stack is merely to carry off the products of combustion. The resulting difference is that the stack for a coal-operated appliance must be much larger than with the gas-operated appliance.

	Anthracite Coal.	Bituminous Coal.	Coke.	Oil.	District Heating.	Electricity.
Cost.						
Investment. . .	Same	Same	Same	Worse	Better	Worse
Maintenance . .	Worse	Worse	Worse	Worse	Better	Same
Thermal efficiency	Worse	Worse	Worse	Same	Better*	Better*
Labour	Worse	Worse	Worse	Worse	Better	Better
Insurance . . .	Same	Same	Same	Worse†	Better†	Better†
Convenience.						
Reliability . . .	Worse	Worse	Worse	Worse	Worse	Worse
Ease of handling .	Worse	Worse	Worse	Worse	Better	Better
Control	Worse	Worse	Worse	Same	Same	Same
Character of heat.	Same‡	Same‡	Same‡	Same‡	Same‡	Same‡
Cleanliness.						
Fuel before use .	Worse	Worse	Worse	Worse	Same	Same
Fuel residue . .	Worse	Worse	Worse	Same	Better	Better
Control of air. .	Same‡	Same‡	Same‡	Same‡	Same‡	Same‡

* Except with certain gas appliances.
† In certain cases specified by fire insurance underwriters.
‡ Only in cases where the appliances are such as to make the fuels directly comparable.

[In an appendix are given two theoretical determinations for coal and gas heaters "based on certain assumptions which are fair representations of average practice."]

Without considering yet any change in the assumed thermal efficiency of the coal heater, which efficiency represents that obtainable when operating the coal heater under the most favourable conditions, it will be well to see what saving could be effected in the gas installation by a reduction in the temperature of the flue products. The authors have already shown that a strong draught is not essential for the operation of the gas heater, and as the draught is a function of the flue temperature, it will be perfectly safe to reduce this temperature to a relatively low point. Gas heater installations have been successfully operated with stack temperatures of 140° Fahr.; this reduction having been obtained by the use of an economizer located in the uptake. If, in the present problem, the flue temperature were reduced to 140° by the use of the accessory just noted, an hourly saving of 8257 B.Th.U. could be effected, which represents 3·1 per cent. of the total energy in the fuel. At 140° the dew-point of the products is neared, which, it will be noted, is 121°. If the water or gas entering the economizer is less than 121°, some of the moisture may be condensed—the amount so condensed depending on the incoming temperature. Supposing that 50 per cent. of the water vapour could be condensed at 140°, then about 10,066 B.Th.U. would be transferred to the economizer—the greater part of the heat resulting from the recovery of the internal energy of evaporation. This would represent a saving of 3·8 per cent.

An economizer could be usefully employed for preheating the return water in a hot-water system or preheating the air in a hot-air system. It would hardly be warranted in the steam system, owing to the relatively high temperature of the returned condensation. It might be economically employed in any of the three systems named for heating hot water for general household purposes.

In passing, it is noted by the authors that at 140° and with 50 per cent. of the moisture condensed, the potential draught would be 0·1 inch of water. The overall thermal efficiency of the installation would become very nearly equal to 82 per cent. If, now, the radiation loss can, by the use of good lagging, be reduced to 6 per cent., and the flue loss be maintained at 6 per cent. by the use of an economizer, as just noted, the saving effected by the economizer would increase to about 13 per cent., and the overall thermal efficiency to 88 per cent.

In any system of heating from a central point there is some loss in service efficiency because of radiation losses from the conduits for the heating medium. This the writers point out is not a total loss; for the heat is given up to some part of the house and is therefore useful. But it is not given as positively to a particular room as where the source of heat is located within the room; and for this reason individual room heaters have a decided advantage over central heating plant. Another great advantage of such heaters is the flexibility of the system taken as a whole; for one or more rooms may be heated as desired. In the case of but part of a building being heated by a central plant, the plant is operated so much below its capacity as to be noticeably inefficient. Any fuel may be used for such individual heaters; but the dirt and annoyance from any fuel but gas, electricity, or district heating preclude their use except in a few special cases.

Reference has been made to an excess cost for cleaning when solid fuel is used. Unfortunately, no definite figures are available; but it is clearly recognized in cities where natural gas generally has displaced coal, that the frequency of cleaning curtains, wall paper, floor coverings, and similar furnishings is much less than when coal is used. This is not alone from the lessened smoke or soot, but also from the absence of dirt tracked into the

house by those whose duties take them to the cellar where fuel and ashes are stored. Much space in the cellar is also made available when storage of fuel or ashes is unnecessary.

While the authors do not wish, in the paper, to discuss the commercial side of the heating question, they feel that they may be permitted to offer a suggestion for the furtherance of the gas heating business. It must be recognized that gas heating is still in its infancy and that it cannot at once attain maturity. A gradual development is the best to be expected, and its steady growth may be best accomplished by co-operation with those on whom dependence must be placed for such growth—the consumers. A glance at some tables of comparative fuel costs included in the paper shows that unless gas is lower, or other fuel higher, in cost than usual, there is a differential unfavourable to gas, which may be nearly, if not entirely, offset by the advantages of gaseous fuel and the economies of operation. As these are most evident during the seasons when the heating is light or intermittent, it appears obvious to the writers that gas men should endeavour to introduce gas appliances as auxiliaries to the present appliances, with the recommendation that they be used only during such times in spring and fall as seem to the consumer to be justified by the operating expense and factor of convenience. They add that they may be used as "boosters" during spells of extremely cold weather when the regular system is inadequate. Such installations have, it is remarked, been in successful operation, and experience shows that the days of use increase with each year as the many favourable features become more patent to the consumer, with the result that in many cases gas will ultimately become the sole fuel used. As such use is optional with the consumer, the probability is that he will be better satisfied than if the use is as specified by the gas company. Such a line of development will not excuse gas people from giving the design, installation, and operation of the heaters their closest attention so as to avoid misuse.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Mansion House Engineers' Meeting.

SIR,—While I thoroughly approve of your exhortations to the Institutions and Societies connected with the gas industry to show activity in co-operating with others who are planning the future of the engineering and chemical trades, I feel it is fair that I should clear myself from the imputation that the Mansion House meeting and the movement generally in regard to which I have acted as organizer on behalf of the British Electrical and Allied Manufacturers, have been conducted with any bias in favour of any section of engineering. I do not think such a suggestion is intentional on your part; and it is rather because I wish to support your vigorous protestations that I address you.

But it might be supposed by some readers that no opportunity was afforded for the gas industry (which has admittedly been of great service in the war) to come in line with the representative Institutions and Associations whose names have been printed as supporters of the meeting. I should have been delighted to extend the list; and I was much encouraged by the letter received from Mr. H. M. Thornton, the Chairman of the Society of British Gas Industries. Unfortunately, that letter was only dated Sept. 20, the very day of the meeting; so that there was no time to deal with it. Its value, therefore, lies in its assurances of goodwill and help in the further developments of the campaign.

I sincerely hope you will continue to urge the necessity for united effort to face the situation.

T. C. ELDER.

104, *High Holborn, W.C.*,
Sept. 28, 1916.

Gas Employees and the National Insurance Act.

SIR,—It seems to me a surprising fact that a strong protest has not come from the gas industry on the confusion arising out of the National Insurance Act, Part II.

In the Act (sixth schedule) are given the six trades which are liable to unemployment insurance; and, among these, the gas industry is not included. There would have been no confusion if the trade of the employer had been the necessary qualification, and not the trade of the employed. Unfortunately, in the interpretation of the Act this was not held to be so; and those men who are employed by gas companies on work which could reasonably be held as coming under the heading of building or construction of works, were held to be insurable. From this point, the descent was easy to the present ridiculous position in which the Act is interpreted by the *ipse dixit* of an umpire, who sits busily giving decisions which I am told now number thousands.

The second part of the Act was, undoubtedly, meant to be a benefit to the workmen, and perhaps it would be to casual labourers employed on gas-works. But these are excluded. On the other hand, the regular workmen who have no fear of unemployment are compelled to pay the weekly contribution for no benefit whatever except the possible attraction of a future refund.

It was at a later date laid down that men "wholly or mainly" employed on work which was part of the building or construction trades were insurable under Part II. Had this "wholly or mainly" applied to a period of one year, it would have been unobjectionable; but it was decided by some official or other that it applied to the period of one week.

From this time it was difficult to say whether many gas companies' employees were insurable or not; and it is not certain now that the decisions of the umpire are necessarily right at law; although in disputes of certain kinds his decision is stated to be final by the Act.

By clause 103 of the Act, power is given to the Board of Trade to extend the Act to a workmen in other trades; and under this clause the Board of Trade has power to extend the doubtful benefits of the Act to all gas-works employees. Why do they not do so, and have done with all the nonsense of the umpire and his decisions? It is because in that case a class of men (gas-works casual labourers) would be included who might possibly benefit by the Act.

The Government, it seems, prefer to steadily extend the net, and extract contributions from those who are unlikely to require any benefit.

In the first instance, the trades were boldly classified; and these were chosen probably as trades in which unemployment was at the time rife, and therefore offered a good electioneering appeal. But now that the Act is an operation, it is gradually being extended to men who do not want it!

Personally, I have read a good many of the umpire's decisions, but have not yet found any method or formula on which they could have been based. For instance, how can cleaning gas-cookers be held to be part of the building trade? And how ridiculous to make a man who works alternatively a water-gas plant and a tar-distillation plant pay for portions of his time only.

Is it too late for our industry to resist this umpire and his farcical decisions?

F. LIVESEY.

Maidstone, Sept. 29, 1916.

Enrichment of Water Gas by Oil Gas.

SIR,—In his article on "Thermal Problems for Gas Engineers," in your issue of Sept. 26, Mr. Norton H. Humphrys, when dealing with the subject of the enrichment of water gas by means of oil gas, calculates a theoretical enrichment of 7·65 candles per gallon of oil per 1000 cubic feet when using 2 gallons of oil.

It may be of interest to readers to know that some eight or nine years ago I installed at the West Bromwich Gas-Works a Peebles oil-gas plant for use in conjunction with the Dellwik-Fleischer blue water-gas plant. After a number of experiments, special retorts were constructed for gasifying the oil, in which arrangements were made for introducing a stream of blue water gas at a high temperature.

Some remarkable results were obtained; the enriching value being continuously over 8 candles, and occasionally reaching 9 candles, per gallon per thousand.

The only reason for abandoning the process was that it was not found practicable to utilize the waste heat from the water-gas plant for gasifying the oil; and as the Peebles plant had to be separately fired, the fuel costs practically balanced the advantages obtained by this method of oil enrichment. In practical working with a modern carburetted water-gas plant, however, the enriching value obtained should be considerably higher than 6⅞ candles per gallon per thousand, as calculated by Mr. Humphrys.

HAROLD E. COPP.

Etruria, Stoke-on-Trent, Sept. 23, 1916.

Public Lighting Charges.

SIR,—Thanks for your article, "Public Lighting Charges," in your issue of Sept. 26. It is particularly interesting to my Board, owing to the attitude recently adopted by the Urban District Council towards the charge for gas used in the public lamps on the average-meter system.

Replying to the query contained in the last few sentences of the article, I may say that no specific price is embodied in our Provisional Order (dated 1898), and we are entirely governed by the public lighting clauses of the Gas-Works Clauses Act, 1871.

By agreement since 1911, we have allowed a rebate of 5d. per 1000 cubic feet off the ordinary lighting price to private consumers, as a voluntary concession. We are resisting the attitude of the Council, that it is theirs by right, although they have had counsel's opinion through some Association, and do not acknowledge their comparisons of what rebates are obtainable elsewhere up and down the country for similar purposes. Clause 24 is quite clear and definite on the matter.

J. F. TYNDALL, Manager,
Whitchurch (Salop) Gas Company, Limited.

Whitchurch, Sept. 27, 1916.

Provisional Order Applications for Next Session.

SIR,—The enclosed communication, which has been received from the Board of Trade in reply to a letter addressed to them by the Society of Parliamentary Agents, will no doubt be of interest to your readers.

A. H. SPENS, Honorary Secretary,
Parliamentary Agents' Society.

2, *Millbank House*,
Westminster, S.W., Sept. 26, 1916.

[ENCLOSURE.]

Board of Trade, Whitehall Gardens, S.W.,
Sept. 20, 1916.

Sir,—I am directed by the Board of Trade to state that they have under consideration your letter of Sept. 8, submitting, on behalf of the Society of Parliamentary Agents, certain representations for a modification of the notice issued by the Board last year, to the effect that applications for Provisional Orders would not be entertained except in cases when extreme urgency existed.

The Board realize that the position has altered since the issue of the notice in question—particularly in the direction indicated in the circular-letter issued by the Local Government Board on the 28th of August last; and in these circumstances the Board of Trade will be prepared to entertain applications for Provisional Orders in the ensuing session when it can be shown that the establishment of works under the schemes proposed will be proceeded with as soon as practicable after the termination of the war.

In determining whether an application shall be allowed to proceed, the Board will have particular regard to the considerations as to how

far the exercise of the powers will provide an outlet for labour, or for the utilization of plant and machinery which have been provided for the purposes of the war.

The Board will be prepared to consider proposals before any expenditure is incurred in respect of the publication of notices, &c., and to intimate whether, in their view a *primâ facie* case has been made out for the promotion of the application, subject to consideration of objections.

The Board are, however, of opinion that it is undesirable that proposals shall be put forward which are likely to provoke serious opposition, or to prove unduly costly to promote.

I am to add that the policy of the Board in dealing with these applications may be subject to further modification in the event of a change in the general situation due to the war.

(Signed) C. HIPWOOD.

The President of the Society of
Parliamentary Agents, Westminster, S.W.

Rendering Coal Smokeless and Increasing the Radiant Heat of Coal and Coke.

SIR,—In your "Editorial Notes" in the current issue of the "JOURNAL," dealing with my proposals for fuel economy, the important point is raised of recovering the volatile constituents of coal which are now consumed (or lost) in the burning of coal in the raw state for domestic and industrial purposes.

In dealing with this question, roughly, 75,000,000 tons of low-grade coals are used annually in the United Kingdom for domestic and industrial purposes. These coals are chiefly of the free-burning and semi-coking classes, containing high percentages of oxygen and hydrocarbons. On carbonization, these coals at either high or low temperatures yield large volumes of water, unstable hydrocarbons, and tar acids, which are of little value for either dye or explosive purposes. The residual carbon being soft, spongy, and friable, cannot be used in domestic grates and for only a few industrial purposes. Before recommending that all classes of coals should be carbonized, information is required as to how the volatile constituents of these coals can be recovered, especially on the following points:

1. A method of freeing the hydrocarbons and tar acids from their associated water.
2. For what purpose the unstable hydrocarbons and tar acids recovered can be commercially used, and their value.
3. For what purpose can the soft friable carbon be used.

It is well known by all gas engineers that—in order to recover the volatile constituents of coal in a valuable form, suitable for dye and explosive purposes, and to produce a saleable fuel which will stand handling and transport, and burn in an open domestic stove, and leave the ash on the grate—the best quality of coking coal is necessary; and the temperature of its carbonization should be above 800° C.

Owing to the action by many local authorities for the reduction of smoke, a large tonnage of these high-class coking coals is now being used for domestic and industrial purposes, with the result that they are now becoming scarce and dear. The question, therefore, arises, if we are to carbonize coals for domestic and industrial purposes, where are we to obtain suitable coal to enable the volatile constituents to be recovered in such a condition as to be suitable for dye and explosive purposes—seeing that at the present time every seam of suitable coal is being worked in our coal areas.

One of the objects of my proposals was to show a method by which these best qualities of coking coals, now being used for domestic and industrial purposes, could be conserved for the future of the gas industry by replacing them with coals of a lower grade.

31, *Station Street, Nottingham, Sept.* 30, 1916. A. ROLLASON.

Record Coal Stock at Oldham.—It was reported at the fortnightly meeting of the Oldham Corporation Gas Committee by Mr. Tim Duxbury (the Engineer) that the deliveries of coal had been very good, and the stocks were now the largest they had ever had—being close upon 30,000 tons. The amount of coal bought not contracted for was between 2500 and 3000 tons; and the total quantity bought by contract was 121,000 tons.

Halesworth Gas Company, Limited.—The Directors recently advertised in our columns the gas-works for sale, and announced their intention of winding-up the Company. Several tenders were received, but none of them were accepted. It has now been decided to continue the Company; and Mr. W. A. Comins will be appointed Chairman of the Board. The affairs of the Company will in future be managed from the office of his firm, No. 50, Cannon Street, E.C.

Loss on the Rickmansworth Gas Undertaking.—At a meeting of the Rickmansworth Urban District Council, Mr. Catesby drew attention to the financial position of the Council's gas undertaking. There was, he said, a net loss of £472 on the past year's working; but he thought that, when all the circumstances were considered, this was not so bad as it might appear. It was a fact, however, which ought to be faced; and he moved that the cash discount allowed to consumers for prompt payment of accounts should be discontinued as from October. This was agreed to.

Saxmundham Gas Company, Limited.—The report of the Directors and the accounts for the year to June last will be presented to the shareholders at the general meeting to-day (Tuesday), at the offices of Messrs. Charles Comins and Co., Chartered Accountants, No. 50, Cannon Street, E.C. The accounts show that the profit for the past year was a satisfactory improvement over that of the previous year. The sales of gas were 6,534,000 cubic feet, compared with 6,288,000 cubic feet. For the past year there has been no public lighting. The dividends on the preference shares have been paid at the rate of 6 per cent. per annum; and on the ordinary share capital a dividend is recommended at the rate of 4 per cent. last year, which will leave the balance to be carried forward at a slightly larger amount.

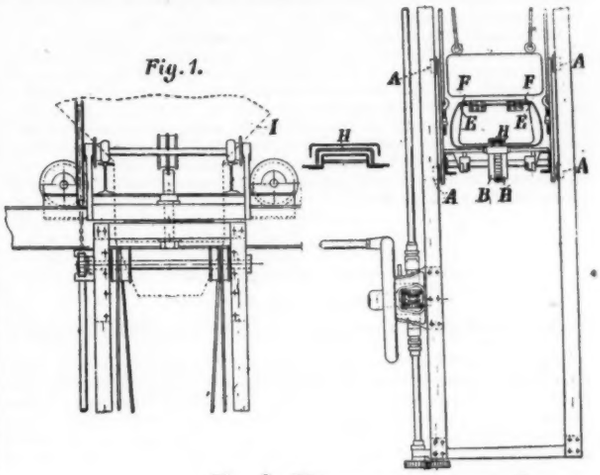
REGISTER OF PATENTS.

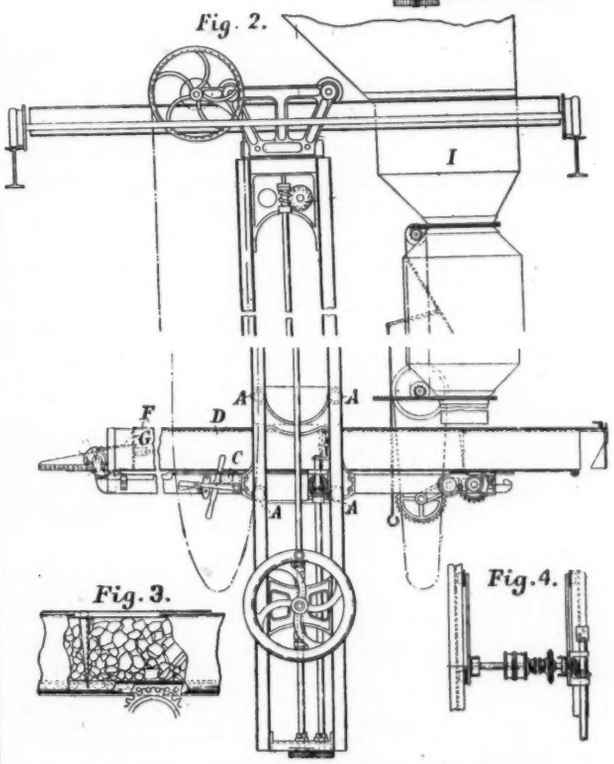
Charging Gas-Retorts.

BIRD, H., ROBERT CORT AND SON, LIMITED, and SIMS, A. G., of Reading.

No. 12,776; Sept. 7, 1915.

This apparatus for charging gas-retorts is of the type in which a scoop suspended from a travelling crane is adapted to be moved longitudinally and transversely of the retort-house, and to be raised and lowered and swung horizontally on a pivot "so as to be readily filled with coal and inserted in the retort—the coal being held in the retort while the shell of the scoop is withdrawn."





Bird and Sims (Cort and Sons) Retort-Charging Apparatus.

Fig. 1 are end views of one form of the apparatus in accordance with this invention. Fig. 2 is a side elevation. Fig. 3 is a detail showing the rack. Fig. 4 is a cross section showing the reversing gear and winding drum.

The horizontal frame of the machine, supported on a cradle, is disposed between four members of a vertical frame, which acts as a guide to the cradle and is pivotally connected to a traveller so as to permit of its being turned in a horizontal plane. It carries at its upper end two pulleys operated by a hand wheel through a worm and worm wheel bevel gearing and shafting. The cradle and horizontal frame are suspended by ropes which pass over these pulleys and are counterbalanced by a weight. Upon the vertical frame is mounted vertical shafting for operating the scoop by means of a hand wheel.

On the cradle of the horizontal frame are rollers A, which work in the vertical guides, and other rollers B C on which the scoop D travels. The scoop is provided on its underside with a longitudinal rack adapted to be operated by a toothed wheel disposed on the horizontal frame.

The upper edges of the scoop are flanged as at E or otherwise formed to carry a sliding frame F on which are pivoted three flaps—one at the forward end and one or more intermediate of its length. These flaps are provided with stops so that they will not turn on the pivots, but will hold the coal in the retort when the scoop is withdrawn. The rear end of the scoop is closed by a plate G. The plates are notched at the base to allow them to pass along the channel H, which extends into the scoop. The front end of the channel is provided with notches; and the back end of the frame F is provided with a pawl adapted to engage in the notches. The rear end of the sliding frame is connected to the winding drum by a steel rope or chain. This is utilized for the purpose of lifting the pawl out of engagement with the notches in the channel H when a strain is put on the rope for the purpose of withdrawing the frame F. For this purpose the rope is passed through an eye in the pawl—the arrangement being such that when the rope is slack the pawl falls into the notches, but when tight it is lifted out of them. Means are provided for locking the apparatus rigidly to the front of the retort when the apparatus is in use.

In operation, the scoop D is filled with coal from a hopper I. It is then travelled to any desired position of the retort-house by means of the travelling crane. It is then raised or lowered to the level of the retort mouth by means of the central hand wheel and swung on its pivot to a position to enter the mouth of the retort. The end of the scoop is then run into the mouth of the retort as far as the horizontal frame will permit. The scoop D and sliding frame F are then travelled forward and the gear operated by the central hand wheel. The scoop is then withdrawn, leaving the coal and the sliding frame in the retort until the scoop has been withdrawn.

Dry Gas-Meters.

ANDERSON, JOHN, of Edinburgh.

No. 13,025; Sept. 11, 1915.

This invention relates more particularly to fixing the diaphragms of dry gas-meters.

The proposal is to grip the diaphragm between inner and outer circular parts which have some capacity for eccentric motion with respect to one another so as to allow for various thicknesses in the leather. The parts are engaged with one another to radially clamp the diaphragm between them by a side, or approximately axial, movement—rolled or beaded edges being also provided to prevent injury to the diaphragm.

The invention also consists in means for fixing the diaphragm in dry meters by using a circular band, a rolled or beaded edge soldered within it, and a further rolled or beaded edge similar in section to the first one but applied in the reverse position; so that the diaphragm is not primarily gripped between the two, but is effected radially between the second roll or bead and the circular or band.

Utilizing Mond Gas, and Recovering Bye-Products.

TWYNAM, T., of Redcar.

No. 14,391; Oct. 12, 1915.

The inventor says: It is well known that by the use of the Mond process of producing a power gas, much larger quantities of ammonia are obtained from the fuel than in the gas made from the ordinary gas-producer. Thus as much as 90 lbs. of ammonium sulphate is obtainable per ton of fuel when the fuel is converted into Mond gas. Much larger quantities of fuel would be gasified by this process if there were always an outlet for the energy which can be evolved from the gas when converted into mechanical energy in any suitable transformer. Against the recovery of the larger amount of ammonia from the fuel, there has to be set the cost of raising the great quantity of steam—some 2½ tons per ton of fuel—required in the process. In many colliery districts, large quantities of low-grade fuel exist which could be readily converted into Mond gas, with consequent recovery of about 70 per cent. of the nitrogen, if it were possible to find a convenient market for the gas, or some means for utilizing the energy evolved from it, on the spot.

The present proposal is to combine with the Mond gas and ammonia recovery plant electric furnaces suitable for the production of nitric acid from atmospheric nitrogen and oxygen. The high-tension electric energy required for the production of this nitric acid is obtained from the energy resulting from the conversion of the Mond gas into mechanical energy in some suitable engine or transformer with subsequent conversion into electric energy of the necessary high voltage. The resulting nitric acid (conveniently of about 33 per cent. real acid strength) is introduced into the ammonia recovery tower of the Mond plant in place of the sulphuric acid ordinarily used; and the ammonium nitrate solution is run off to crystallize out the ammonium nitrate in any convenient plant.

Coal-Gas Making Apparatus.—No. 101,306.

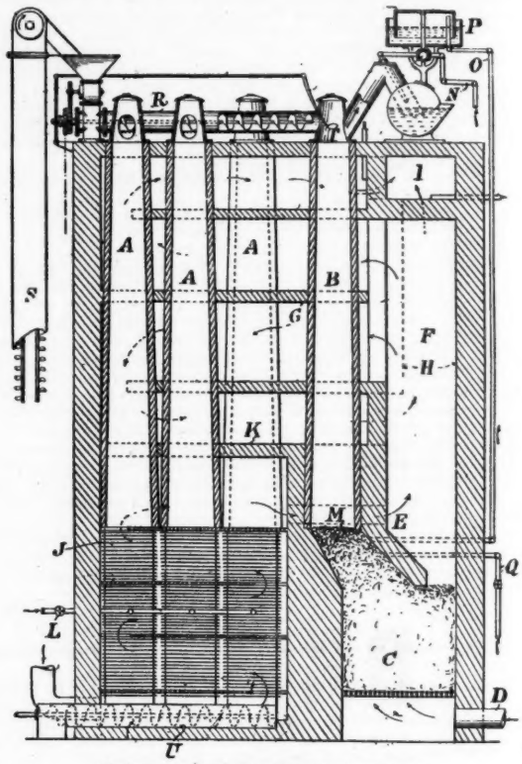
CARROLL, L. D., of 38, Victoria Street, Westminster; a communication from C. S. CHRISMAN, of Philadelphia, U.S.A.

No. 2783; Feb. 24, 1916.

The patentee proposes to arrange in a common retort chamber several vertical retorts one of which is in direct communication with a gas-producer, "so that coke from the retort passes directly into the producer without loss of heat, where it is traversed by a blast of air so as to form producer gas, which is immediately consumed in a combustion chamber to which secondary air is supplied, and the products of combustion led into the retort chamber for heating the several retorts."

In the illustration three of a set of six vertical retorts A are shown; also a retort B (to which reference is made later on). C is a gas-producer to which air is supplied at D. The producer gas as made ascends and, meeting the secondary air supply at the nostrils E, burns in the chamber F, in which intense heat of combustion occurs, "which is well adapted to stand it, so that the retorts are not exposed to this intense heat." From F the producer gas, secondary air, and hot products of combustion enter the retort chamber above and below the partition G, and then pass upward and downward around baffle-plates, escaping by flues I, disposed on each side of the chamber, upward to the off-take, and by way of an opening (shown by dotted lines) directly to the off-take. The distribution of heat between the upper and lower parts of the retorts is adjusted by dampers. The lower parts or bases J of the retorts may be made of metal "which is obviously advantageous as it facilitates the transfer of heat, and may be provided with cooling rings." K is a partition beneath which is a chamber for heating the secondary air, which enters the chamber, passes over the baffle-plates and around the retorts, and reaches the nostrils E. In doing this, the secondary air is heated, while at the same time the lower parts of the retort, and the coke contained in them, are cooled—"thus the sensible heat of the coke is imparted to the air, and the coke is recovered comparatively cool, which is, of course, advantageous." To facilitate the use of (say) cast iron for making the bottom parts of the retorts, steam is introduced into the bottom part of the retorts by the connections L. This cools the coke, and any water gas resulting ascends through the retorts.

The retort B produces the amount of coke which is necessary for supplying the producer C in such a way that the fuel level in it may be kept constant—thus ensuring uniform production of producer gas and, consequently, providing for the uniform heating of the retorts. The retort is in direct communication with the producer by means of a throat M, so that coke from the retort passes directly into the producer without exposure to air and consequent loss of sensible heat and without handling, and, in the case of a continuous apparatus, continuously.



Chrisman's Coal-Gas Making Apparatus.

As gas from the retort is to be saved and not burned in the producer or combustion chamber, it is, of course, necessary to prevent coal gas from the retort reaching the producer and to prevent producer gas from reaching the retort and escaping from it along with the coal gas. This can be accomplished by two means, to be used either singly or in combination.

N is a supply of coal gas under pressure connected with a jet in the dip-pipe from the retort. In this pipe, there is a valve controlled by a gas-governor, connected with a pipe O opening at or near the base of the retort—and responsive to pressure thereat. The governor consists of an inverted bell dipping into liquid contained in a receptacle P and overlying the open end of the pipe O. By this arrangement the pressure at the throat controls the discharge through the jet, which, in turn, draws gas from the retort B; thus lowering the pressure therein and preventing the escape of coal gas from the bottom of the retort. Should the pressure at the throat fall off, the jet will be reduced, thus adjusting the pressure in the retort.

The second means referred to comprises a steam-jet Q discharging so as to generate more or less water gas, "which constitutes a means for properly adjusting the relative pressures of the retort and producer." If desired, the steam-jet may be regulated by means of a governor controlled valve in accordance with the pressure at or near the base of the retort, as described in connection with the gas-jet. The pressure at the base of the retort and the pressure in the throat should be relatively such that coal gas from the retort does not reach the producer and producer gas from the producer should not reach the retort. Thus these pressures are substantially balanced, and the two means described are singly or in combination adapted for the accomplishment of this result.

At the top of the structure there is a screw conveyor R, to which the

coal to be carbonized is delivered from an elevator S by way of a feeder which prevents the escape of gas. Ordinarily the conveyor maintains a continuous feed to the various retorts; but should it become jammed, the material will crowd the end T of the lever and shift it and the clutch, and arrest the feed. At the base of the retorts there is a screw conveyor U, the housing of which communicates with the lower ends of the retorts A.

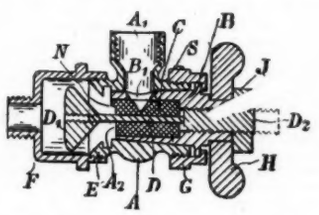
The operation of the apparatus may be summarized as follows: The material to be carbonized is lifted by the elevator S, and fed to the various retorts by the conveyor R. At the same time cool coke is continuously removed from the bottom of the retorts by the conveyor U. The secondary air takes up the sensible heat of the coke by passing around the lower parts of the retorts, so that the coke is delivered cool. Coke continuously descends from the retort B to the producer, keeping the level of fuel substantially constant, and thus ensuring uniform heating conditions for the retorts. The proper relative pressure is maintained at the lower part of the retort B, and the upper part of the producer or throat M for causing the coal gas to ascend from B and for excluding producer gas therefrom.

Gas-Tap and Pressure Regulator.—No. 101,324.

WILSON, W. A., of Armley, near Leeds.

No. 6866; May 13, 1916.

This combined gas-tap and pressure regulator is said to be noiseless when the freeway for the gas is fully or partially open, and combined with the tap there is a pressure regulator arranged so that there are no sharp edges for the streams of gas to come in contact with.



Wilson's Combined Gas-Tap and Pressure Regulator.

The tap or valve body A has a gas inlet A^1 to one side and an outlet A^2 at one end. In the valve body is seated a hollow plug B provided with apertures B^1 to coincide, when in the open position, with the casing inlet A^1; and to insure that there are no sharp edges in the opening B^1 for the gas to pass over, there is put inside the plug a gauze C of suitable mesh. In the closed end of the plug B is a thread to receive the threaded end D^2 of a shaft or spindle D, on the other end of which is mounted a coned valve or regulator D^1. The spindle is capable of being moved in the plug to actuate the coned valve towards or from a seating E formed in the valve casing; and in this casing is provided a projection to engage a notch N in the plug, which prevents it being turned completely round. An outlet union F engages the lower end of the valve body and encloses the pressure regulator cone. A collar G at the operating end of the plug retains it in position in the barrel; and a set-screw S fixes the collar. The end of the plug is formed to receive a tap or lever H, and a lock nut J engages the threaded end of the spindle to lock the pressure regulator in the desired position and yet permit of the operation of the tap.

The gas passes into the valve plug through the inlets A^1 and B^1, and thence forward, with only one change in direction, to the outlet—the flow being regulated by the pressure regulator or coned member D operating towards or from the seating E as desired.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 27.]

Nos. 13,192—13,544.

AISH, W. H.—"Hot hearth or plate for top of gas cooking-stoves." No. 13,206.

BARBER, S.—"Treatment of carbonaceous and hydro-carbonaceous substances, and obtaining products therefrom." No. 13,498.

BARRON, W.—See Aish. No. 13,206.

BROSSE, P. E. M.—"Automatic igniter for gas-burners." No. 13,244.

BYRD, A. A. A.—"Recovery of aniline dyes." No. 13,219.

COBBE, G. W.—See Byrd. No 13,219.

CRUYT, L.—"Treating and cooling air and gas." No. 13,260.

DONALD, P. G.—"Laying and supporting pipes." No. 13,368.

DRAKE, W. A., and DRAKES LIMITED.—"Vertical retorts." No. 13,455.

FISK, E. J.—See Byrd. No. 13,219.

GROSSMANN, J.—"Manufacture of ammonium nitrate." No. 13,396.

HALL, I.—"Gas-fired furnaces." No. 13,318.

HEENEN AND FROUDE.—See Cruyt. No. 13,260.

HORNE, C.—"Lighting shops, &c." No. 13,463.

KATZ, A.—See Byrd. No. 13,219.

LAPPIN, F. A.—See Horne. No. 13,463.

LEA, F. R.—"Light screens for shop windows." No. 13,512.

ROSEMBERG, J. M. M.—See Brosse. No. 13,244.

TRIESCH, E. See Byrd. No. 13,219.

TYRER, D.—"Manufacture of ammonium nitrate." No. 13,297.

TYRER, D.—"Method of separating phenol or its homologues from an aqueous liquid." No. 13,423.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Thursday, at the Offices, D'Olier Street, Dublin—Mr. JOHN MURPHY (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report and accounts [see "JOURNAL" for Sept. 19, p. 567], was sure the latter would be considered satisfactory, in view of the exceptional state of affairs during the past six months. There had been a considerable reduction in the quantity of gas sent out and an increased cost of production, on the one hand, with very satisfactory results as regarded residuals on the other. The decrease in consumption was entirely due to three causes: The Sinn Fein outbreak at Easter; the effect of the Daylight Saving Bill and police restrictions; and the earlier reading of the meters, which, on this occasion, was completed by June 30. As compared with the corresponding six months of 1915, there was a reduction in the sales of 69½ million cubic feet. Capital expenditure during the half year amounted to merely £1417, the greater part of which represented the cost of purchasing new cookers, fires, and other heating appliances. It would be noticed, however, that the deductions from capital expenditure were heavy; the principal items being in connection with the lamentable and unfortunate disturbances, when certain property of the Company, both at the works and on the district, suffered damage. The total of all the deductions amounted to £12,368, of which £8484 entirely related to loss by fire and damage to property during the Sinn Fein outbreak. The two remaining items were in connection with sales of old material and the usual depreciation written-off stoves and fittings.

THE ACCOUNTS.

On turning to the revenue account, the profit for the half year showed a decrease compared with the corresponding six months of £16,502; but, when the loss of gas sales and residuals during the period of enforced idleness was taken into consideration, the result could not be regarded as unfavourable. The cost of coal and oil, and also the rates of freight—especially the latter—had advanced considerably in comparison with a year ago; and it was therefore not surprising that, under this head, the expenditure showed an increase of no less than £17,748. Against this, however, there was a gratifying increase of over £12,000 from coke and breeze, and further gains of £1500 and £500 respectively from tar and liquor. There was an increase in the charge for repair of works amounting to £2339, and in the other items relating to manufacture of £767. These increases were almost entirely due to the advances in wages and higher cost of materials. The total expenditure on distribution, after deducting the sales of gas-fittings, amounted to £14,310; and this showed a saving of £1222. In connection with the lighting and maintenance of the public lamps, a small profit had been realized, amounting to £38, as compared with a debit of £657 in the corresponding half year; and this improvement was considered satisfactory. The charge for rent, rates, and taxes disclosed a slight increase, which was occasioned by heavier rating arising out of the revaluation of the Company's property. The cost of management was approximately the same, while the miscellaneous and special charges showed an increase of £753, accounted for by a reversion to the contribution to the officers' superannuation fund, which amounted to £1000, and increases in war bonus, with, on the other side, a saving under the heading of bad debts of £470. Looking at the credit side of the revenue account, the net receipts for gas for all purposes were less by £11,424 in comparison with the corresponding half year. On the other hand, although the gas sold to prepayment consumers showed a reduction of 22½ million cubic feet, yet the amount received for rental of prepayment meters and stoves gave an increase of £178; and this figure, in view of the circumstances, was regarded as very good, being an evidence of marked improvement in collecting. Passing on to the net revenue account, it would be noted that the interest payable to the banks in respect of overdrafts had been reduced from £1389 in the corresponding half year to £655, which represented a saving of £734 in interest during the six months. It would be seen that a further half-year's contribution of 10s. per cent. on the paid-up capital had been appropriated to the special purposes fund. This was thought necessary, in view of the fact that the entire expenditure, both capital and revenue, incurred in connection with the disturbances had been debited to this fund, which, as they were aware, was specially created for exceptional expenditure of this nature. It was hoped that the entire sum would be refunded by the Treasury in due course; and as soon as the claim was settled, the amount received would be placed to the credit of the fund. With respect to the balance-sheet, bank overdrafts and sundry creditors amounted at June 30, 1915, to £70,194; whereas the corresponding items this half year came to £64,067, or a decrease of £6127. On the assets side, the stocks on hand showed an increase of £1831, although the accounts due to the Company were less by £4491. As to the works, he was happy to state that all the damage done during the disturbances had been made good—with the reservation that the gas-holders, which had been riddled by shot and shell, had only been repaired by patching. They could not be put into a proper state until they were re-sheeted. The retort-settings also suffered considerable damage; it being impossible to look after them from the time the works were seized until possession was again obtained by the Company. These points, however, had had attention, and had been dealt with in the statement of claim for damages sustained. The works generally had been maintained in an efficient condition. It would be remembered that last half year they were able to show a profit on purification. This time they were unable to do so, not because working results were not as good as on the last occasion; but, owing to the disturbances, they were unable to prepare and send away the spent oxide from the works. This was, of course, sold now; and the current half year would reap the benefit. The present position with regard to coal was most satisfactory. They had now over 30,000 tons actually in stock. The same remark applied to oil, as they were carrying an ample and substantial stock, to be prepared for emergencies. The price of gas oil

ruled very high; but, taking it in connection with an old contract, the average price during the last half year came out at a reasonable figure. The process of washing the gas for toluol extraction was still in action; and they were therefore contributing their quota towards the supply of materials necessary for the successful prosecution of the war. The Directors were wishful of contributing still further in this connection, and laid a scheme before the Ministry of Munitions; but, owing to the considerable quantity of sectional steel required for the extension of their coal-gas plant, the Ministry could not see their way to sanction the scheme, notwithstanding the fact that it would not have required any further expenditure on capital account.

THE REBELLION—AND AFTER.

As no doubt they fully realized, the eventful occurrence of the half year had been the disturbances in April last. Their claim for damages had been carefully prepared, and was at present in the hands of the tribunal appointed for the purpose of determining these claims. He could not therefore enter into details, except to say that the works were occupied on April 28 by the Sinn Feiners, and that the manufacture of gas had necessarily to cease from that date. Seven days later, and during the cessation of the supply of gas to the city, the two trunk mains crossing O'Connell Bridge were fractured by an explosion; about 120 feet of cast-iron main being destroyed. The work of providing temporary connections was started next day; and four days later these were completed, and the supply of gas resumed on the morning of May 10. The re-starting of the works and the clearing of the mains were completed without accident. He should not be doing justice to their officials and workmen, if he did not say publicly that the utmost credit was due to them for the skill and unremitting energy displayed during this trying period. The clearing of the trunk mains without accident, and the prompt manner in which the repairs, both on the works and the district, were dealt with, were achievements on which they were to be congratulated. He wished especially to draw attention to the fact that, after a cessation of the gas supply to the entire city for a fortnight, and the isolation of the mains in the destroyed area, the supply was resumed without the slightest hitch or accident under the able supervision of their Engineer, Mr. William Newbigging. The Directors had endeavoured to recognize the special effort of their principal officers by the presentation of services of silver to the Secretary, Engineer, and Works Manager, and gratuities to other officials concerned—a proceeding of which he felt sure the shareholders would approve. It would be very difficult for anyone not residing in Dublin to realize the condition of the city; but he had referred to the matter only so far as the Company's interests were concerned.

Mr. W. H. DAVIES, in seconding the motion, said the Chairman's explanation had been most lucid, and fairly covered all the ground. He was sure there would be no second opinion about the result of the half-year's working, considering the adverse circumstances under which they had been labouring. The trouble the continuation of the war brought in its wake was quite sufficient, he assured them, to keep them all on the rack. Added to this was the Easter outbreak, which was suddenly sprung upon them, like a bolt from the blue. Indeed, it was only through the energy and dogged perseverence shown by the officials and workmen—in many cases at the imminent risk of their lives—that they had been able to pull through so handsomely. The Chairman mentioned the greatly lessened consumption of gas; but the cause was quite obvious, and altogether beyond their control. They were anxious to increase the consumption of gas; for the establishment and other standing charges, rents, rates, and taxes, were very heavy, but did not increase in the same ratio as the consumption. Therefore, an increased quantity was bound to be mutually beneficial to consumers and shareholders. This was the goal they were making for; and it might interest the shareholders to know that for some weeks prior to the outbreak at Easter, steady cumulative increase was to be seen. He expected the balance-sheet would have shown this, but he hoped the pleasure was only deferred. They would naturally like to know something about the prospects; but the continuance of the war precluded any attempt at prophecy. The Chairman had pointed out the improvement in the financial position as compared with twelve months ago. Though this was satisfactory, if the comparison were extended to two years ago it would be still more marked. At that time, they were indebted to bankers and creditors in the sum of £128,161; and at June 30 last the figure was £64,064—or a reduction of one-half. In addition to having more than doubled the stocks of coal and oil, for which they had had to pay very much higher prices, they had earned full statutory dividends for the past three half years—and all this, too, without increasing the price of gas. They considered that this was not a bad achievement in the troublous times they had been passing through. They were, however, a long way from their ideal, which was to bring down the price of gas and increase the dividend. He could assure the shareholders that the Board and officials were working harmoniously together, and that on the cessation of hostilities—when, he trusted, materials would get to something like pre-war prices—they would rapidly forge ahead.

Mr. R. L. ANDREWS, on behalf of the shareholders, expressed his satisfaction with the great recovery the Company had made under the present directorate, and referred in complimentary terms to the Chairman and the Lancashire representatives, though he wished to include the Board as a whole. He emphasized the necessity of avoiding in future any patronage of German materials, and added his tribute to the efficiency with which the works had been managed. He spoke very hopefully of the future, and said he had a message of encouragement which he would take back to his friends in England.

The report and statement of accounts were then adopted.

On the motion of the CHAIRMAN, seconded by Mr. SCALLAN, a dividend of 5⅛ per cent. per annum on the consolidated ordinary stock was declared.

The meeting concluded with a vote of thanks to the Board, officials, and staff, proposed by Mr. ANDREWS, and seconded by Mr. J. M'BRIDE.

A dividend at the rate of 7 per cent. per annum on the preference shares for the eighteen months ended June 30 last has been paid by the Ottoman Gas Company.

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly General Meeting of the Company was held last Wednesday at the London offices, No. 11, George Yard, Lombard Street, E.C.—Mr. R. S. GARDINER in the chair.

The SECRETARY (Mr. A. W. Brookes) read the notice calling the meeting, the report of the Directors, and the Auditors' certificates attached to the general and the Norwich accounts. The report of the Directors was as follows:

The Directors submit the half-yearly accounts of the Company to June 30 last, as examined and certified by the Auditors, who have also vouched for the correctness of the investments held by the Company.

The available profit is £30,155, after deducting the following sums: Income-tax, £7367; interest on debentures, £4012; interest on debenture stock, £1920—total, £13,299.

HULL.—The gas rental shows an increase of £1885, as compared with the corresponding period of 1915; the price of gas having been increased from 2s. 1d. to 2s. 4d. per 1000 cubic feet from April 1 last. The gas sold shows a decrease of 69,834,543 cubic feet, equal to 9·47 per cent. The profit, after writing-off £1000 on account of the reconstruction of No. 3 retort-house, is £16,623; being £5053 less than the parliamentary interest. The small amount which remained in the reserve fund was not sufficient to meet the loss on realization of the investment of that fund. The balance of the loss is therefore charged against the half-year's profit, which is thereby reduced from £16,623 to £14,018.

NORWICH.—The gas-rental shows an increase of £7677, as compared with the corresponding period of 1915; the price of gas being 3s. as against 2s. 10d., in each case subject to reductions for gas used for manufacturing and other purposes. The gas sold shows an increase of 39,557,684 cubic feet, equal to 14·48 per cent. The profit realized is £4,798 in excess of the parliamentary interest.

POTTERIES.—The gas-rental shows on increase of £3422, as compared with the corresponding period of 1915; the price of gas to ordinary consumers being 3s. per 1000 cubic feet, as against 2s. 6d., both with a rebate of 3d. for prompt payment. Special discounts to large consumers and to consumers of gas for power purposes are also allowed. The gas sold shows a decrease of 9,067,009 cubic feet, equal to 4·48 per cent. The profit realized is £2739 in excess of the parliamentary interest.

TROWBRIDGE.—The gas-rental shows an increase of £335, as compared with that of the corresponding period of 1915; the price of gas having been 3s. 5d. per 1000 cubic feet, against 3s. per 1000 cubic feet, both with discounts according to consumption. The gas sold shows a decrease of 2,617,187 cubic feet, equal to 7·08 per cent. The profit realized is £367 less than the parliamentary interest.

HOLYWELL.—The gas-rental shows an increase of £70, the prices of gas having ranged from 4s. 8d. to 3s. 1d. per 1000 cubic feet, as compared with 4s. 2d. to 2s. 8d. The profit realized is £295.

The total profit added to the previous balance of profit and loss amounted to £116,019; and from this sum the Directors have set aside as a nucleus of a "Parent Company Reserve Fund" the sum of £20,500. They now recommend a dividend at the rate of 10 per cent. per annum, with a bonus of 2s. 6d. per share, both less income-tax. The dividend and bonus will amount to £25,650, leaving a balance to the credit of the profit and loss account of £69,869.

The Directors who retire by rotation are Mr. Robert S. Gardiner and Mr. Henry Woodall. The Auditors are Mr. E. Knowles Corrie and Mr. William Cash. They respectively offer themselves for re-election.

THE LATE SIR CORBET WOODALL.

The CHAIRMAN, in moving the adoption of the report and accounts, said his first reference must be to the very severe loss which the gas industry in general, and this Company in particular, had sustained through the death of Sir Corbet Woodall. His services to the gas industry, and the void which had been created through his death, had been emphasized elsewhere. It was his (the Chairman's) duty that day to refer more particularly to the grievous misfortune which this Company had suffered through the loss of his services. Sir Corbet had been a Director of the Company for 25 years, and Chairman since the lamented retirement of Mr. Horsley Palmer in 1914. He followed every detail of the business with the closest attention; and notwithstanding the many other claims upon his time, he frequently visited their works, and was always ready to give their engineers the benefit of his advice. His long experience and professional knowledge were of inestimable value to the Company; and those who had been so long and so closely personally associated with him there missed that suavity of manner that was united to such an inflexible determination of purpose; and they would cherish his memory for long years to come. ["Hear, hear."]

THE NEW DIRECTOR.

It had not been easy for the Directors to decide between the several candidates who offered to fill the vacancy on the Board, either of whom would have rendered the Company good service, and would have been welcome as a colleague; but in finally appointing Mr. Henry Woodall as a Director, the Directors were influenced by the fact that, as a professional gas engineer and a director of many important gas undertakings, his advice and assistance were likely to be of great value to the Company; and it would be idle to deny that it was particularly agreeable to the Directors that the son of their late Chairman should possess qualifications that enabled them to appoint him in his father's stead. He had already visited the works at Norwich and Trowbridge, and had given them useful assistance. ["Hear, hear."]

HOME FROM THE FRONT.

He was sure the proprietors would be pleased to see Mr. Palmer present that day, recovered from the severe wound which he sustained at the Front. He was now on sick leave, during which he had been good enough to attend at Board meetings. He (the Chairman) was sure that if, and when, he had to return to the Front, the best wishes of the proprietors would accompany him for a safe return in a not too distant future.

FEATURES OF THE ACCOUNTS—THE HULL RESERVE FUND EXHAUSTED.

The accounts now submitted were satisfactory in the present state of affairs. They showed that in the half year under review the Company earned £45,847, as compared with £39,734 in the corresponding half year. The Directors therefore recommended the usual dividend at the

rate of 10 per cent. per annum, and the reduced bonus of 2s. 6d. per share, as in the three previous half years, less income-tax, adding the balance of £4505 to the undivided profits. There were two outstanding features in the accounts to which he would direct special attention. One was the exhaustion of the Hull reserve fund, which had necessitated a charge of no less than £2604 against the half-year's profits, in order to meet the loss incurred on the realization of the investment representing the fund. They viewed its disappearance from the accounts with the greatest possible regret. But it must be borne in mind that it partly existed for the purpose of enabling the Company to postpone for as long as possible increasing the price of gas. In December, 1911, the fund amounted to nearly £50,000; and they hoped the consumers at Hull realized how well the Company had served their interests in exhausting the whole of the fund before increasing the price of gas to such an extent as would, it was hoped, enable the Board to make both ends meet at that station. Prior to the war, they were able to sell gas at Hull at a very low figure; and even after the two increases of 3d. each, the price was now only 2s. 4d., which compared very favourably with the price of gas in almost every other town in the kingdom.

A GENERAL RESERVE FUND.

The other salient feature of the accounts was the appearance of a new item—viz., £20,500 appropriated from the undivided profits of the Company to the creation of a reserve fund, which was now represented on the other side of the accounts by £32,526 of Local Loans Stock. For a long time, he had wished that the parent Company possessed a reserve fund that was not confined to any one station, and that would be available for any of the ordinary objects of such a fund, including the equalization of dividends, meeting unforeseen contingencies, &c. He had always considered it was a weak point in their accounts that only certain of the stations had a reserve fund, because it might have well occurred that the need of such a fund might have arisen at a station where one did not exist. With the unanimous approval of his colleagues, and with the concurrence of the Auditors, a general reserve fund had now been created for the first time in the Company's history. It would considerably strengthen the Company's position; and he hoped that, in years to come, it might be possible to add to it from time to time; and that the fund would always be represented by realizable liquid assets. The existence of the fund would not affect the reappearance in more prosperous times of the special reserve funds at the stations, to which they had to carry any surplus profits over and above the parliamentary interest in accordance with their Acts of Parliament.

GAS SALES, COAL, AND CAPITAL.

The total quantity of gas sold at all their towns in the half year showed a decrease of 3·36 per cent., as compared with the corresponding half year, which showed a decrease of 3·64 per cent. on the corresponding half of 1914, or a total falling-off of 6 88 per cent. compared with the pre-war period. The coal carbonized in the half year had cost £20,042 more than in the corresponding half year, and the coke and residuals yielded £11,403 more. They had most carefully limited all additions to the capital account to absolutely unavoidable essentials; and the total increase at the stations during the half year amounted only to £2317. At the same time, they had not stinted any desirable expenditure chargeable to revenue on the repair of works and plant, which he could assure the proprietors had been maintained in a high state of efficiency. Taking the stations individually, the main reason for the unsatisfactory half-year's results at Hull was the increased cost of coal, and the further decrease in the sale of gas—viz., 9½ per cent. on the corresponding half year of 1915, which itself showed a decrease of 5½ per cent. on 1914, so that there had been a total decrease since the war of 14½ per cent., which was the more unfortunate as prior to the war there had been a satisfactory increase, and for that reason they had spent a considerable sum to extend the works, so that they had now a large amount of additional capital that was unproductive for the time being. In reference to the deficient revenue at Hull, it must be borne in mind that the past half year had not had the full benefit of the last increase in the price of 3d. per 1000 cubic feet, which only came into force on April 1; so the Board looked forward more hopefully to the results of the current half-year's working at that station. At Norwich, the consumption of gas showed an increase of 14½ per cent. over the corresponding half year. This unexpected and exceptionally large increase was taxing the producing power of the works; and they were giving their serious attention to the study of how best to meet the demand. He recently visited Norwich in company with his colleagues; and they had secured for new works a two years' option over a site that seemed suitable between the railway and the river. As an alternative, Mr. Glover was preparing plans for increasing the capacity of the works on the present two sites. Coke and other bye-products had yielded an increased revenue at this station; and great credit was due to Mr. Glover for having so successfully worked-up a large local trade in coke, and for his profitable management of the tar distillery at Yarmouth. At the Potteries, the increase they had been compelled to make in the price of gas had now enabled this station to earn its full parliamentary interest; and he hoped they might be able in course of time to make good the arrears that were due on this account. At Trowbridge, there was again a decrease in the sale of gas, and also a decrease in the profit.

BENZOL AND TOLUOL.

In accordance with the country's demand for benzol and toluol so urgently required for the manufacture of explosives, the Company had done their best to produce their share of the Army's needs. At Hull, Trowbridge, and Holywell, they had adopted the tar-washing process, which increased the benzol and toluol contents of the tar. At Norwich and at the Potteries, they had erected oil-washing plant, which recovered an increased yield of benzol and toluol. The plant at both these stations had been warmly commended by the Ministry of Munitions, and yielded most satisfactory results.

COAL SUPPLIES AND OTHER TOPICS.

The Directors had been able to obtain the necessary supplies of coal from their usual providers at prices based on the Price of Coal (Limitation) Act, but had suffered from occasional delays in delivery. They had, however, been able to maintain adequate stocks of coal which, he thought the proprietors would be glad to hear, at present averaged nine weeks' requirements at all the stations. The relations with the local authorities in the various districts continued to be of a friendly character. The Board had endeavoured to meet them in a conciliatory spirit—especially in war time—in all matters that had arisen between them, such as the allowance to be made in respect of diminished public lighting and so on; and they would continue to do their utmost to consider their interests, and co-operate with them for the public weal.

THE WAR—LABOUR, GOOD CAUSES, AND THE WORKS.

The serious inconvenience and difficulties from which their managers were suffering owing to the shortage of labour still continued. Some 352 men had joined His Majesty's Forces; and, since the beginning of the war, the Company had contributed no less than £3615 towards the support of their families. The proprietors would be sorry to hear that sixteen of the staff had lost their lives in the service of the country. The Directors considered it the duty of the Company to make some contributions to war charities in the course of this year. They had recently contributed £50 to the Young Men's Christian Association, whose huts had been of such great benefit to the soldiers at home and abroad, as their own men had testified; and the Directors intended to contribute a further £100 to the British Red Cross Society, to whom their own wounded men had also been indebted. It might be that, in so doing, they were exceeding their powers; but he felt sure no shareholder would question the propriety of the donations. ["Hear, hear."] He must only touch lightly on the fact that, owing to their two largest works being situated in the Eastern Counties, they had had cause to be exceedingly anxious on the several occasions upon which these districts had been visited by hostile aircraft. The works had so far escaped injury; but the anxiety of the Directors and of the managers and staff had been very great. They were passing through a very difficult period that was putting to the test all trades and all industries. It gave the gas industry another opportunity of again evidencing its infinite resourcefulness and unquenchable vitality. Under the circumstances, the results of the past half-year's operations were, on the whole, such as to deserve the entire satisfaction of the proprietors; and it was with complete confidence that they would receive their full approval that he begged to move the adoption of the report and accounts now submitted.

Mr. FREDERICK WILKIN seconded the motion.

Mr. C. WEBB asked whether the Company had colliers of their own to carry coal, or did they charter vessels.

The CHAIRMAN replied that the Company had no works at which a steamer could discharge coal. At Hull, they received most of their coals by rail, and what did reach the works by water was simply coal unloaded from rail into barge. At Norwich they had had some difficulty in the past year, because their freightage contractor had a small steamer for the conveyance of their coal as far as Lowestoft which was requisitioned by the Government. So that even the possession of a steamer might not necessarily give them the assistance they expected. They had lately received most of their coal for this station by rail. The Company did not, therefore, own any colliers or barges; and, under the circumstances of their position, he did not think it would suit the Company to acquire any at the present time.

The motion was unanimously carried.

THE DIVIDENDS AND BONUS.

On the proposition of the CHAIRMAN, seconded by Major-General W. T. CORRIE, a dividend was declared of 20s. per share, with a bonus of 2s. 6d. per share, both less income-tax.

THE DIRECTORS AND AUDITORS.

Moved by Mr. WILKIN, and seconded by Mr. LEWIS R. ABBEY-WILLIAMS, Mr. Gardiner was re-elected to his seat at the Board.

The CHAIRMAN expressed his thanks, and moved the re-election of Mr. Henry Woodall as a Director. He said he could only repeat that the Board had every reason to hope that Mr. Woodall's qualifications would render him a very valuable Director. It had been a personal pleasure to so many of them who had sat in that room with Sir Corbet Woodall for twenty-five years, week after week, to think that his son's qualifications fully justified them in appointing him as a Director.

Mr. H. G. PALMER seconded the motion, which was heartily agreed to.

Mr. WOODALL having thanked the proprietors,

VOTES OF THANKS.

On the proposition of Mr. KENNETH R. MACKAY, seconded by Mr. BERNARD F. HARRIS, Mr. E. Knowles Corrie was reappointed an Auditor; and subsequently, on the motion of Mr. WEBB, seconded by Mr. MACKAY, Mr. William Cash, F.C.A., was also reappointed.

Mr. HENRY PULLMAN moved a vote of thanks to the Chairman and Directors. He remarked that the proprietors deeply sympathized with the Board in the great and irreparable loss they had sustained—the loss of their colleague, and the proprietors' esteemed friend, Sir Corbet Woodall. They desired at the same time to congratulate the Board upon having selected the son of Sir Corbet to fill the vacant position, for they were of the distinct belief that the bearer of the honoured name of Woodall would be a source of advantage to the continued prosperity of the Company. They thanked the Chairman for the lucid statement he had laid before them. It seemed to him to teem with subjects for congratulation, although fraught with difficulties on all sides. The proprietors might equally congratulate themselves on being the recipients of such a statement.

Mr. S. HAROLD HARGROVE seconded the motion, which was cordially passed.

The CHAIRMAN, on behalf of his colleagues and himself, thanked Mr. Pullman for the very appreciative terms in which he had referred to the Directors. He (the Chairman) could assure the proprietors that the management of such a Company as this in times like these was no sinecure. They were all doing their best to deal with the difficulties that arose as and when they occurred. Referring to the anxieties of the Board naturally led him to allude to the anxieties of the staff. If they in London, at a distance from the works, were anxious and worried

over the strenuous times through which they were passing, how much more must their managers feel the strain. It was no mere figure of speech to say that they were exceedingly fortunate in the officers of the Company. Their Secretary (Mr. Brookes) was one of the ablest executive officers with whom he (the Chairman) had had the pleasure of working. Besides the management of the offices which was becoming increasingly difficult owing to the numbers of the staff who had been taken away for military service, he kept a watchful eye over every detail of the business at all the stations; and of his services they could not speak too highly. They were equally fortunate at their stations. Most of the Directors were at Hull the other day; and it was really wonderful to see Mr. Young so cheerful and so hopeful under the depressing conditions that existed there. Mr. Glover, of Norwich, was one of the foremost Engineers of the day; and Mr. Copp, whom the Board recently appointed as Manager of their works at the Potteries, seemed likely to entirely fulfil the high expectations they formed at the time of his selection. He moved a hearty vote of thanks to the Secretary and the officers for their services.

Mr. ABBEY-WILLIAMS seconded the motion, which was passed.

Mr. BROOKES, on behalf of the officers, said the vote was especially encouraging and stimulating in these difficult times; and it would be very gratifying to all those included in it. He should like to say how much the references of the Chairman and Mr. Pullman to the late Sir Corbet Woodall would be appreciated by the officers, all of whom had the greatest admiration for their late Chairman, and would never forget the extremely kind consideration they always received at his hands. The Engineers had told him (the Secretary) how pleased they were that Mr. Gardiner had been elected to the chair. They felt that the leadership of the Company was in strong hands at a critical period in its history. He should have much pleasure in conveying to the several officers the vote of thanks that had been so cordially passed.

THE BRIGHTON COMPANY'S CALORIFIC VALUE ORDER.

Objections of Local Bodies.

Last Tuesday evening the Shoreham-by-Sea Urban District Council met specially to consider the application of the Brighton and Hove General Gas Company to the Board of Trade, under the Gas (Standard of Calorific Power) Act, 1916, for an Order to substitute for the standard of illuminating power at present in force a standard of calorific value.

The Chairman (Mr. M. L. Cook, J.P.) stated that he had attended an informal preliminary meeting of members of the Southwick Council with a view of talking the matter over; it being suggested that there should be uniform action between Southwick, Shoreham-by-Sea, and Portslade-by-Sea. He did so after consulting with the Vice-Chairman, Mr. Chapman. It was simply a question, said the Chairman, of seeing how the land lay. Portslade-by-Sea was not represented. Several points were raised by the Chairman of the Southwick Council and the Deputy Clerk, having in view the safeguarding of the interests of the gas consumers; and thrashing the matter out, he came to the conclusion that it was only right, as far as he could see, that the consumers should be protected in some way. It was suggested at the meeting that a letter should be sent to the Parliamentary Agents, pointing out certain objections that they had to the proposed Order, with a view of getting their opinion upon it; but he explained to them that he had no authority from his own Council to say they would spend a farthing on opposition. He said he would lay the matter before the Council; and if they approved of it, no doubt they would be prepared to share in the small outlay which would be incurred in getting the alterations desired. Answering a question, the Chairman said he supposed that the Company were taking the proposed step in connection with what they were doing for the Government; but they (the Council) should see that the gas consumers would have some return for what they might give up. It was necessary for the country, and their opposition would not suggest that they should oppose altering the illuminating standard of power; but the consumers must be protected from not getting the value they should have.

The Clerk pointed out that the powers the Company might acquire now they would get for all time, and not merely for the period of the war; and once they got the Order there was no power to get any compensation or satisfaction.

Mr. Hackett said he understood that Brighton and Hove were lodging objections as well.

Mr. Peak suggested that they could enter a formal objection and then decide what they should do in connection with the neighbouring authorities.

Eventually, it was decided to lodge formal notice of objection.

The matter was also considered at a special meeting of the Southwick Urban District Council, when Mr. F. F. Flinn, J.P. (the Chairman), said if the Gas Company were making the application for any purpose of a national character the Council would have no wish to oppose it; but they had to consider whether after the war was over the interests of the consumers would be jeopardized by the powers the Brighton Gas Company were seeking to obtain. If the Council thought there would be anything detrimental to the ratepayers who were consumers, then it was their duty to give notice of opposition. One of the principal points seemed to be that, if the standard of calorific power were to be adopted without any time-limit, and would hold good after the war was over, they should insist that it should at any rate be equal to the illuminating power which was the present standard of test. Another important point was the question of pressure, which he believed was mentioned in the Company's application. If the new standard was to be adopted permanently, he thought they should take expert advice as to whether the calorific test was equal to the old standard of test by illumination. In the next place, they should insist, as far as lay in their power, that the gas should be supplied at such a pressure as to give its full value to the consumer. Mr. G. Grundy moved that the Council give notice of objection, and that the co-operation of Shoreham and Portslade be welcomed. Mr. J. Boyle seconded, and the motion was carried.

SUMMER TIME ACT IN THE LIVERPOOL DISTRICT.

Effect on the Demand for Gas and Electricity.

In view of the end last Saturday night—for the present year at all events—of the operation of the Summer Time Act, a number of calculations have been made as to the effects of the measure on the businesses of gas and electrical undertakings. Inquiries made by the "Liverpool Post" go to show that consumers there of gas and electricity for lighting purposes will find themselves approximately £35,000 in pocket. Of this sum, £25,000 has been saved on gas alone.

Mr. Edwin Upton, the Treasurer of the Liverpool Gas Company, in an interview, said that the Act had undoubtedly led to very big saving to private consumers as a body. He pointed out, however, that individual cases could be traced where there had been an actual increase of consumption. The decreased output of the Company for the six months closing on Sunday would be below 4 per cent., as compared with 15 per cent. in certain districts; but the saving to the private consumers as a whole was far greater than the former figure would indicate. While the darkening order and the licensing restrictions, together with the earlier closing of shops, had added to the falling off in consumption attributable to the Act, the Company had made up leeway and commanded permanently more business by the increased consumption through cookers and by the multiplication of gas engines and furnaces as a means of labour saving in the engineering trades. Mr. Upton declared himself strongly in favour of the Act, because, besides conducing to the public health, it had proved to be a great domestic economy. From the electrical department of the Liverpool Corporation, no definite statistics could be gleaned; but an available basis of calculation showed that the saving on the domestic lighting bills would not be less than £10,000.

Although the Act had substantially affected the Birkenhead Corporation gas undertaking, it is not easy to make any statement as to the exact amount of gas saved. Several circumstances other than the putting of the scheme into practice have tended to diminish gas consumption. The increase in price and the almost entire extinction of the street-lamps have caused a great diminution in the amount of gas used. From all causes there is a decrease in consumption of about 25,000,000 cubic feet; but expert opinion places the proportion of the decrease attributable to the Act at less than one-half of this amount.

The Bootle Corporation Electrical Engineer (Mr. T. D. Clothier) gave the average saving to private consumers in his borough as 15 per cent., or, in a round sum, at the increased price not introduced in Bootle until July, £1000.

At Wallasey, while very little reduction has taken place in the consumption of gas as compared with the same period of the previous year, there has been a decrease of 11 per cent. in the amount of electric current used, though the cost of production exhibits little or no falling off. In the case of gas, the slight reduction in the amount consumed for lighting during the summer months was more than made up by the increased amount used by stoves, which are being introduced in larger number for cooking purposes. Much of the reduction in the output of electricity compared with the same months of last year is accounted for by the circumstance that a more stringent street-lighting regulation came into force last January, so that there has been a great saving in this respect. The reduction in the output would have been still greater, but for the fact that there has been a considerable increase in the number of consumers.

FIXING A CALORIFIC STANDARD BY EXPERIMENT.

The Massachusetts State Position.

There has been received from Mr. Alonzo R. Weed, the Chairman of the Board of Gas and Electric Light Commissioners of the Commonwealth of Massachusetts—as a result of the article appearing in the "JOURNAL" for Aug. 8 in reference to the inquiry the Board are conducting relative to the establishing of a calorific value standard for gas—a copy of the statement made on behalf of the Board at the hearing last June, and which has since been put in print.

It is premised that the Act under which the hearing was called was passed upon the recommendation of the Board, and in the form in which the Board desired its recommendation expressed. This step was taken by the Board after a good deal of consideration and in the light of studies made by the Inspection Department from time to time and of investigations and experience elsewhere. The Board therefore desired to explain more specifically than was practicable in its recommendation to the Legislature its views and purposes with respect to the Act and its administration—not that it should be assumed that any conclusions had been reached which may not be modified or abandoned upon proper and convincing representations by any person interested, whether on behalf of the companies or of the public. In other words, notwithstanding certain rather definite plans about procedure, the Board approached the problem "in a spirit of inquiry, satisfied of its importance to all concerned in the distribution and use of gas in the Commonwealth, and anxious only for a wise, workable solution."

They then proceed: The candle power standard has been in force in some form since 1861, and on the present minimum basis of sixteen candles since 1892. For a number of years past it has become increasingly evident that the candle power test is not thoroughly satisfactory or strictly scientific. The Statute requires that, during the test, the gas "shall be burned from the burner best adapted to it, which is at the same time suitable for domestic use." This requirement (and probably no other would be just) involves the use of burners still suitable for domestic use, but (by reason of changes in the art) no longer in actual use and not likely to be, since more economical and efficient burners are available. Furthermore, there has been a rapid increase in the use of mantle burners, whose efficiency in the interest of the consumer depends upon the heat value rather than on the illuminating power,

which is equally true for gas for heating and cooking. This means that the quality of gas expressed in terms of a candle power standard represents conditions less and less encountered in the actual use of gas at the present time, and not necessarily conclusive of the value of the gas delivered to consumers. A calorific test is, on the other hand, truly scientific; and, if properly and carefully conducted, it determines on a comparable basis the value to the consumer of the gas supplied to him. Moreover, a series of tests several years ago conducted by the inspector developed what similar inquiries elsewhere have confirmed—that there is no fixed law with respect to the relation of the heat value and candle power.

Nevertheless, a series of tests by the inspectors last year, of a considerable variety of gas throughout the State, made reasonably clear a workable minimum heat-value for gas produced under existing practices. This same result has followed from similar investigations elsewhere, especially in New York and by the Bureau of Standards. It is therefore possible to adopt a heat value standard, without much further investigation, which would ensure continuance of the quality of gas now supplied, even though the candle power test were abandoned.

But the problem has seemed to the Board broader than the mere adoption of a heat value in connection with, and perhaps later in substitution for, a candle-power standard. The consumer pays for whatever is used in the production of the gas supplied. If he is paying for something which does not finally reach him, or if a large majority of consumers are paying for something which, in view of the use made by them, is of little or no value when delivered, then it may well be that a different quality of gas will be of more service, and that this difference may be defined in a calorific standard materially lower than one designed merely to continue present conditions. This certainly has seemed to be the motive leading both England and Canada not only to substitute heat value for candle power in gas testing, but to adopt a lower minimum than has been undertaken in the very general movement towards a heat value standard throughout this country.

With these considerations in mind, the Board is convinced that an attempt should be made to solve this broader problem, as a part of its inquiry preliminary to establishing any calorific standard. It will be impracticable, however, to do so merely by laboratory tests. The Board therefore requested, and the Legislature granted for a limited period, a suspension of the candle-power test with respect to such plants as may be designated for experimental purposes in connection with the inquiry. This was to enable the managers of such plants to operate them, without fear of a penalty for deficient candle power, upon such basis as they or the Board might deem best calculated to deliver to the consumer the greatest value for his money in view of the use to which, for the most part, the gas is used. For such experimental purposes the Board has fixed a tentative minimum of 500 B.Th.U. It follows as a matter of course if the candle-power standard is suspended, and until a heat-value standard has been determined as required by the Act that no penalty will result if this tentative minimum is not maintained. But the companies will certainly appreciate that the whole value of the inquiry, and its importance to the gas industry, will be seriously impaired unless the utmost good faith and candour are observed by the managers of the plants designated for such experimental purposes.

It is the plan of the Board that this experimental period shall run for six months. The Board, through its inspectors, will keep in close touch with the plants designated; and, in addition to their own tests, daily reports will be required from the managers and chemists in charge of the works. It is also essential that the managers undertake to make from time to time such reasonable changes in their methods of production as the Board may recommend. Carried out in the right spirit, the Board believes that results may be obtained which will not only enable it to act wisely in the determination of a calorific standard in accordance with the terms of the Act, but will be of value to the future development of the gas business.

Already the manager of the Holyoke municipal plant has placed it at the disposal of the Board for this experimental purpose; and a similar offer has been made in behalf of a number of the companies. In order that as much information as possible may be gathered, covering all the varying conditions of production necessitated by the size and location of the works, the Board is inclined to make the offer to designate any plant or plants whose management is prepared to co-operate with the Board in an effort to solve this problem in a scientific and broad-minded spirit.

One of the requirements of the Act is the installation of suitable calorimeters in all plants over a certain size. This is essential to the successful working out of the plan, as the apparatus is delicate and liable to injury if frequently transported. The Board is, therefore, ready to suggest the water-flow type—such as the Hinman-Junkers—as satisfactory, and also to receive and consider suggestions as to any other types.

Doncaster Municipal Accounts. — The Doncaster Corporation accounts for the year ended March 31 show that the profits from the sale of gas were more than £2000 below those of the previous year; while the water-works surplus dropped from £3000 to £1081.

Metropolitan Water Board and Wages.—At their meeting last Friday, the Metropolitan Water Board decided, on the recommendation of the Works and Stores Committee, to restore to the employees in the Engineers' Department, at a cost of about £6600 per annum, as from the 1st inst., the increment of wages which they might have been expected to receive had such increments not been suspended in consequence of the first grant of the war bonus. They also resolved to incur an expenditure not exceeding £10,250 in granting to permanent and temporary employees of the department who are married and receive the war bonus already authorized, but who are not serving in the forces, an additional war bonus of 2s. per week, or such less amount as may be required to bring their total earnings, excluding emoluments and overtime, up to 40s. per week.

A MEMO FROM MAINS.

You will need *still* more D.S.O.
and St. Nicholas Fires this season.
Notwithstanding "War pressure"
we shall be ready for your orders.
Let us know your needs *early*.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

NOTES FROM SCOTLAND.

Edinburgh and Leith Gas Commissioners' Estimates.—At a meeting of the Edinburgh and Leith Gas Commissioners on Monday of last week, the estimates of income and expenditure for the year to May 1, 1917, were, on the recommendation of the Works Committee, approved. The present charges for gas, which have been in force since the autumn of last year, are to remain in operation, with the exception of those for public and stair lighting, which are to be increased from 2s. 4d. and 2s. 5d. to 3s. per 1000 cubic feet. The sale of gas has been estimated at 1,871,438,000 cubic feet—a decrease of 4 per cent. compared with that for 1915-16. From the remarks of the Engineer (Mr. Alexander Masterton) at the recent meeting of the North British Association of Gas Managers, it would appear that 3 per cent. of this is attributable to the Summer Time Act. Notwithstanding, however, this reduction in the estimated quantity, the revenue from gas for the current twelvemonth is expected to show an increase of £11,961. As regards residuals, it is anticipated that coke will improve on last year's figure by £1095, that tar will do neither better nor worse, and that sulphate of ammonia will show a decreased yield of £1715. It is clear from these small variations on the results for 1915-16 that the framers of the estimates are of opinion that the residuals market for the current year will remain much as it was during the period covered by the last annual accounts. There are two new items on the income side of the statement which are interesting: Amount due for extraction of toluol and benzol, £18,390; and interest on value of plant and buildings taken over by the Ministry of Munitions, £610. In a letter to the Convener of the Works Committee, the Engineer stated that the demands by the Ministry of Munitions for the materials required for the production of high explosives had affected the quality of gas supplied during the past year; and the estimates took this factor into consideration. The quality of gas supplied from Granton had been fully up to the calorific test, which is now the parliamentary standard for such places as London, as well as Liverpool and other Provincial towns; and the estimates were framed on the understanding that the Commissioners would continue to manufacture gas of this value. Furthermore, while the Commissioners had made contracts for their coal requirements for the current financial year, these contracts were subject to any addition which might be authorized under the Price of Coal (Limitation) Act. It was assumed that the war would extend throughout the current financial year; but should peace be declared earlier, the figures might be materially affected.

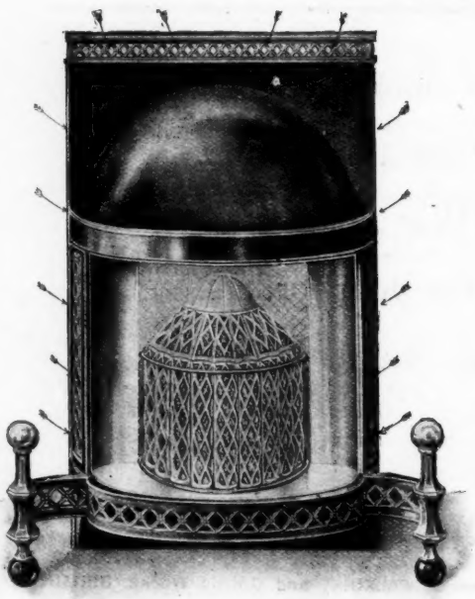
Liquid Ammonia Production.—The Edinburgh and Leith Gas Commissioners have instructed the Engineers to consider and report what they thought the Commissioners should do in consequence of the provisions of the Gas (Standard of Calorific Power) Act; and it has been remitted to a Sub-Committee to see to the immediate erection of the necessary plant for the production of pure liquid ammonia, to supersede the manufacture of sulphate of ammonia, as required by the Government.

Dundee and the Summer Time Act.—The effect of the Summer Time Act on the gas consumption in Dundee was dealt with by Mr. Alex. Yuill (the Manager) at the meeting of the Gas Committee last week. Mr. Yuill reported that, dealing with the period from May 21 to Sept. 24, the quantity of gas delivered for all purposes was 275,133,000 cubic feet, as compared with 289,467,000 feet in the same period last year, which was equal to a decrease of 4·95 per cent. Dividing the days into two periods, and taking the hours from 2 p.m. until midnight, when the demand for gas was regarded as for lighting purposes, the output for the period was 75,003,000 cubic feet, as compared with 85,629,000 feet—equal to a decrease of 12·41 per cent. In the eighteen hours from midnight to 6 p.m., when the gas was for the most part required for cooking and power, the quantity sent out was 200,130,000 cubic feet, which was a decrease equal to 1·82 per cent. On dividing the days into two periods and taking the hours from 6 a.m. to 6 p.m., when the demand for gas might be regarded as for cooking, heating, and power purposes, the output from May 21 to Sept. 24 was 171,901,000 cubic feet, or an increase of 10,782,000 cubic feet and 6·69 per cent. Taking the twelve hours from 6 p.m. to 6 a.m. as being the period when gas was used for lighting purposes, the output was 103,232,000 cubic feet, against 128,258,000 feet last year, showing a decrease equal to 9·57 per cent. The net result was equal to a saving of about £2000.

Labour in Controlled Establishments.—In the course of the proceedings at a meeting of the Dundee Gas Committee, Mr. Nairn referred to the case of a man employed at the gas-works who was convicted at a recent meeting of the Munitions Tribunal for leaving his work. Mr. Nairn explained that the man was a mason, but had been employed as a labourer. He wanted to return to his own trade, but as a result of the proceedings against him was unable to do so. His information was that the man intimated that he was going to leave his work, and that the foreman failed to report his decision. Mr. A. Yuill (the Gas Manager) replied that the gas-works being a controlled establishment, no employee could leave without receiving the permission of the Ministry of Munitions. There was no vindictiveness in the matter. Labour was scarce; and it was a question of keeping their employees. It was stated that if the man worked for six weeks he would get his clearance certificate.

Financial Position of the Falkirk Gas-Works.—At the meeting of the Falkirk Town Council last Tuesday, Treasurer Gilchrist, in moving the adoption of the Finance Committee's report on the estimates of income and expenditure for 1916-17, said the Council were not in a good financial position with regard to the gas-works. The high price of coal had affected the working expenses; while it was estimated that this year there would be a reduction of 10 per cent. in the output of gas. The corresponding reduction in sales meant a considerable loss of income. In order to make the gas department secure, the Com-

The Twin Principles of the "R.H.D."



The "R.H.D." (Radiant Heat Distributor) showing ventilating principle.

1. **Radiation distributed over a wide area:** the whole room adequately and uniformly heated. The only gasfire which *distributes* the high thermal energy emitted by the modern gas heating stove.

2. **Air for Ventilation drawn from a wide area,** giving ample air change without creating undesirable draughts and without loss of heat; the air being drawn through the coolest parts of the iron frame.

The "R.H.D." gives the ideal combination of pure heat, equally distributed, with hygienic ventilation, scientifically achieved.

THE RICHMOND
GAS STOVE & METER CO., Ltd.,
Warrington and London.

mittee desired an increase in the price of gas of 2d. per 1000 cubic feet during the remaining two quarters of this year, which would bring in £1000, and allow of a credit balance at the end of the year of £251. Last year there was a loss on the electricity works of £156; and unless the price of current was raised, there would be a loss again this year. It was therefore recommended that the cost of electricity for lighting be increased 5 per cent., and for power 10 per cent., which would be sufficient to meet the expenditure of the department and leave a balance of £172. He thought the Council should be gratified that the prices of gas and electricity were not much higher. Both departments were worked economically. Mr. Miskimmin, in seconding, said they regretted the increased prices; but the cost of materials having substantially increased, the Council could not meet the expenditure without passing them on to those making use of gas and electricity.

Town Gas for Motor-Cars.—In a paper read before the Foremens' Association of the Glasgow Corporation Gas Department [some extracts from which were given on p. 620 of last week's "JOURNAL."], Mr. R. Liggett dealt with the use of town gas for motor-cars; and the subject has since been referred to by Mr. A. Fraser Sinclair in the motoring notes of the "Glasgow Herald." Weight of containing tanks, Mr. Sinclair says, has hitherto been regarded as an all but insuperable obstacle to the popular use of gas as motor fuel; and it has to be confessed that, so far as private cars are concerned—especially private cars for long distance travel—the objection stands. But in the case of passenger vehicles for comparatively short-distance journeys, such as those from the centres of towns to their suburbs and return, the new development presents most promising features. In the current issue of the "Commercial Motor," he continues, there is an interesting account of the use of town gas for the propulsion of char-a-bancs, and other similar vehicles, in which the storage vessels, instead of being of the nature of a burden, rather act as a sort of buoy to assist in raising the vehicle from the ground. In the town of Beeston, in Nottinghamshire, there is a firm of garage keepers who have regarded the rise in petrol prices with no little disfavour. It occurred to them that town gas might be employed as fuel; but, as many others have found, they discovered that, if it were to be carried in compressed form in heavy and strong cylinders, the extraneous weight would be excessive, and would, in fact, more than counterbalance the advantage of the cheaper fuel. So they temporized. If gas could be carried in a bag for balloon and Zeppelin purposes, it could be carried in a bag to furnish fuel in an internal combustion engine for vehicle propulsion. A canvas bag lined with rubber in form suitable for the top was made and installed; and with it the vehicle runs all right. There is no trouble about filling the bag, which is done from the gas-meter; and the inlet-cock also serves to feed the engine through the medium of a flexible pipe, which is attached to a cock on the inlet-pipe of the engine. The supply of gas is regulated by means of the cock operated by the usual throttle valve lever. The gas-bag contains 450 cubic feet at atmospheric pressure, but if covered by fine steel wire net could no doubt stand the pressures of three atmospheres, or three times the quantity mentioned..

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 2.

There is still no change to record in the tar products market. Pitch for export remains at 20s. net per ton, and creosote at about 4d. net per gallon, in bulk at makers' works. The prices of the liquid products which are controlled by the Ministry of Munitions are unchanged. Crude tar is worth about 2¼d. per gallon delivered.

Sulphate of ammonia is quite steady, notwithstanding some difficulty in obtaining export licences. The export price is £17 7s. 6d. net per ton in buyers' bags, *ex* makers' works. Large quantities are being bought for the home trade both for prompt and forward delivery.

Tar Products in the Provinces.

Oct. 2.

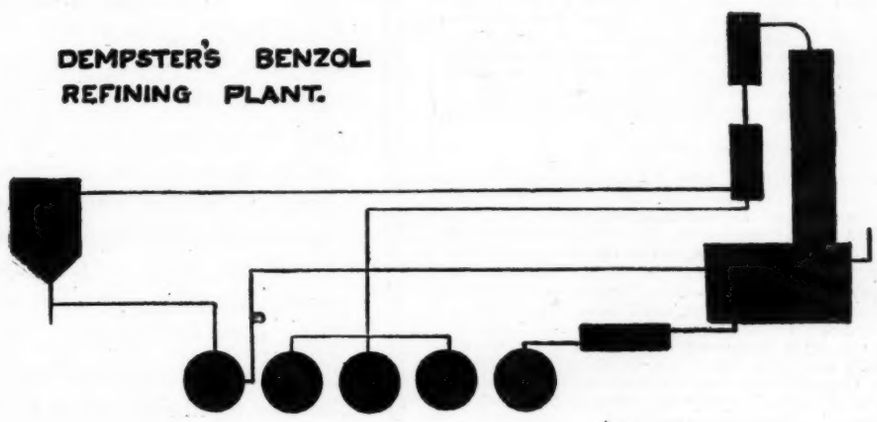
The markets for tar products remain about the same. Pitch is still very quiet. A few transactions are reported which are not having very much effect on the market. Solvent naphtha is in very good demand. Creosote continues very weak. There is not much inquiry for heavy naphtha at the present moment.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 6d. to 19s. 6d. Pitch, East Coast, 16s. to 16s. 6d. per ton; West Coast—Manchester 15s. to 15s. 6d., Liverpool 16s. to 16s. 6d., Clyde 17s. to 18s. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 10d. to 1s. 11d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2d. to 2¼d. Heavy oils, in bulk, 3¾d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2½d. to 2¾d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Sept.* 30.

Throughout the week the market for this material has continued inactive, and prices have been inclined to give way further. The War Trade Department have not afforded relief to the situation, and buyers, in the absence of permission to export, have shown little disposition to make further contracts. The nearest values for prompt delivery are now £17 12s. 6d. per ton f.o.b. Hull, £17 15s. f.o.b. Liverpool, and £17 17s. 6d. f.o.b. Leith. For future delivery the ideas of manufacturers have remained unchanged, but purchasers have not been disposed to pay the premium required.



DEMPSTER'S BENZOL REFINING STILLS

AT THE PRESENT TIME ARE PRODUCING

100,000 GALLONS

OF REFINED PRODUCTS PER DAY.

R. & J. DEMPSTER, LTD. MANCHESTER.

Nitrate of Soda.

The tone of this market has become firmer, and holders on spot now require 17s. 9d. per cwt. for ordinary, and 18s. 3d. for refined quality.

Sulphate of Ammonia.

From another source it is stated that this article is quoted as follows: Outside London makes, £16 15s.; Hull, £17 12s. 6d.; Leith, £17 17s. 6d.; Liverpool, £17 15s.; Middlesbrough, £17 12s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is steadier, though there is not a very full supply of steamers; so that the shipments are not so great as they would have been. The demand, however, seems to be stronger, and prices on the whole are firmer. In the steam coal trade, exports are good, in the circumstances. Best Northumbrians are from 37s. 6d. to 40s. per ton f.o.b.; for second-class steams, about 30s. to 35s. per ton is quoted; and for steam smalls, the price varies from 19s. to 24s. per ton. The output is on the whole well maintained, and is fairly taken up, though for forward delivery there is a little uncertainty as to the prices that may rule. In the gas coal trade, there is now a more rapid increase in the consumption, and there is more disposition to buy ahead. It is reported that several lots of second-class gas coals have been sold for delivery over next year, at prices that are believed to be somewhere near 25s. per ton f.o.b. Current quotations are from 33s. to 34s. 6d. per ton f.o.b. for best Durhams; from 26s. to 27s. 6d. per ton for second-class Durhams; and for "Wear Specials" 34s. to 36s. per ton. The freight market continues firm, and adds materially to the cost of gas coals delivered abroad. From the Tyne to Genoa, about 72s. is still the freight; but to the French ports the "limitation rates" rule. The Tyne to London freight is remaining about 12s. Coke is in good demand; but at the moment licences for export do not seem to be quite as freely granted, so that the home needs are better met. Good gas coke is now quoted from 33s. to 35s. per ton f.o.b.; and the freights are shown by 36s. per ton having been paid from the Tyne to Dunkirk. Forward prices are irregular.

Windsor Royal Gaslight Company.

The Directors reported at the half-yearly meeting of the Company that the prosperity of the undertaking continued, and they were able to propose the payment of full statutory dividends. The Board hoped that there would be no occasion to increase the price of gas. The Chairman (Mr. W. B. Holderness, J.P.), said the results of the six months' working compared very favourably with those of previous half years. He was glad to say they had entered into very favourable coal contracts at prices slightly higher than those of last year. Supplies were coming in well, and good stocks were being maintained, thanks to the Railway Department of the Board of Trade. Considering the high prices they were paying for everything, they were lucky to be in a position to avoid the raising of the price of gas. The report was adopted, and dividends for the half year ended June 30 were declared (less income-tax) at the rates of 5 per cent. per annum on the preference shares, 10 per cent. on the ordinary shares, and 7 per cent. on the new shares. Replying to a vote of thanks, Mr. Herbert Buckley (the Manager) mentioned that between forty and fifty of the men had joined up.

Exemption for an Assistant Gas Manager.—At the Silsden Tribunal, exemption was sought for the Assistant Manager of the Gas-Works, who is 22 years of age. He had sole charge of the pumps and engines, and repaired all the breakdowns. His services were essential owing to his intimate knowledge of the service mains in the district. Conditional exemption was granted.

Witham (Essex) Public Lighting.—At the monthly meeting of the Witham Urban Council yesterday week, the Finance Committee reported having considered a claim from the Witham Gas Company amounting to £65 13s., up to Midsummer, on account of the lighting contract. After fully discussing the matter, the Committee resolved to recommend the Council "that they could not admit any liability under agreement, as the Gas Company had failed to carry out the terms of the agreement." The report was adopted.

United District Gas Company.—Informal accounts submitted at a meeting of the Company, held at the London Offices last Wednesday, showed a gross profit for the half year of £939, compared with £1529 for the June half of 1915. After meeting debenture and other preferential charges, and transferring £193 to the special purposes fund, there remains a balance of £513 to be carried forward. It was explained that, under the prevailing circumstances, it was thought better to present an interim report, and leave the presentation of audited accounts until the end of the year. Dividends declared and remaining unpaid stand in the balance-sheet at £2912.

"Coalite" in the Money Market.—It is reported that at last a move is likely to be made in altering the financial position of the Coalite Company's shares. According to the "Chemical Trade Journal," a month ago the £1 ordinary shares were quoted round about 10s.; but last week they changed hands at 18s. 6d., while the deferred 1s. shares, which previously were about 9s. or less, were marked 10s. 6d. There are two Coalite companies, but Coalite Limited is the parent concern—having been formed ten years ago to secure certain patents throughout the world. So far no dividend has been paid on the capital, which consists of £94,050 in £1 ordinary and £12,500 in 1s. deferred shares. At the end of 1915 there was a debit balance of £19,182, and cash stood at £188. The patent rights for the United Kingdom were sold to "British" Coalite, in which it holds a substantial interest. The latter was formed in 1907. It originally had a capital of £2,000,000; but in 1914 the authorized capital was reduced to £400,000, of which 100,109 ordinary and 183,037 deferred shares of £1 each. are issued. In this case, also, no dividend has yet been paid.

PARKINSON
Gas Fires

Model:

Chatsworth

THE beautiful Chatsworth series of Parkinson Gas Fires have the supreme advantage that every working part is exactly standardized.

One spare set of parts is sufficient for the average necessary repairs of each size in the whole of a series; since every working part can be removed by hand, interchange can readily be effected in a few moments. There is no fuel-guard.

Simplicity of construction reduces the cost of maintenance to the very lowest.

The Lancet declares the Parkinson Gas Fires to be hygienically perfect.

An illustrated Catalogue will be sent free with pleasure.

The Parkinson Stove Co. Ltd.

Birmingham . Stour Street, Spring Hill.
London . . 129 High Holborn, W.C.

Gas, Coke, and Electricity Prices at Abertillery.—At last week's meeting of the Abertillery District Council it was decided to increase the price of gas by 9d. per 1000 cubic feet, coke to 17s. 6d. per ton, and electricity by 1d. per unit.

Big Demand for Gas at Lancaster.—That the Lancaster Gas Department had been strained to the utmost to produce every cubic foot of gas possible out of the coal-gas plant, aided by the carburetted water-gas apparatus, was the information which Alderman Sir N. W. Helme gave the members of the Town Council at their last monthly meeting. The consumption for the quarter ended June 30, compared with the same three months of 1915, shows an increase of 6 per cent., but taken over a longer period the increase amounts to 12 per cent. New works have, it seems, been taking a much larger amount of gas than the Corporation had arranged to supply. This recital led one member to suggest that perhaps the "suffering consumers might be relieved of some of the large increase in the price of gas put upon them." The reply, however, was that the Committee did not think they could bring up a proposal now; but they would re-consider the matter. Something of the other side of the picture was revealed when the Alderman mentioned that the cost of new retorts had been £280 per bed, instead of £150, which was the pre-war price.

Proposed Reduction in Price at Darlington.—The Darlington Gas Committee have decided to recommend that the price of gas be reduced 2d. per 1000 cubic feet to ordinary consumers. This will not involve a reduction in slot-meter prices, as a concession has been given to these consumers since the price of gas was raised.

Exemption for Gas Company's Confidential Clerk.—Before the local Tribunal last week, the Plymouth and Stonehouse Gas Company appealed for the exemption of a clerk who had been passed for general service in the army. Sir Joseph Bellamy (the Chairman of the Company), supporting the appeal, said seventy of the Company's employees had joined the forces. The Directors were patriotic, and would not claim for an employee if they were not absolutely certain they could not get on without him. The Mayor (Mr. T. Baker) remarked that time had been given the Company to find a substitute for this man; but Sir Joseph replied that it was absolutely impossible to do so. The man was his confidential correspondent, and was also in close touch with the co-partnership interests. Two clerks had gone; while some of those left were being re-examined, and would probably be found fit. The Mayor said conditional exemption would be allowed, so long as the applicant was employed as at present; but he must at once join the Volunteer Training Corps.

STOCK MARKET REPORT.

THE event of the week—outshadowing everything else, and neutralizing even the stimulating action of our wonderful war news—was the Government surprise move of cutting down the rate of interest upon Treasury Bills (which had exceeded the gigantic total of £1,000,000,000), and of offering the public 6 per cent. Exchequer Bonds redeemable at par in February, 1920. The immediate effect of this in Capel Court was to knock the bottom out of the gilt-edged market, and to give a nasty jar to some of the nearly-gilt securities.

Not unnaturally, as their prices went rolling down hill some other things were drawn in with them. War Loan, Consols, and such like, which, all unsuspecting, had made nice advances in the first of the week, fell down to very low figures. Home Rail prior charges followed suit. Americans and Argentines were checked in an upward course which looked promising.

The Foreign Market was weak, and the French Loan was much easier, though the approaching new issue had some share in this. A part of this issue is earmarked for London. South Africans were perhaps about the firmest line. In the Miscellaneous group, rubber was in good case; but textiles and metals were easier.

Business in the Gas Market had quite a revival to a point almost approaching activity. The aggregate of transactions marked far outnumbered the best of recent weeks; and they were well distributed through the list. Prices generally were well maintained; but Gas Light ordinary was ¼ easier.

In the Money Market, there was a large demand as the end of the quarter approached, but supplies were adequate. Discount rates were firm. The Canadian Loan was subscribed twice over.

Bargains done for cash during the week were as follows: On Monday, Brighton and Hove Original 166½, 167¼, ditto ordinary 122, British debentures 68, Cape Town 28s., Gas Light ordinary 80, 80¼, 80⅜, ditto maximum, 60¼, 60¾, ditto preference, 74⅛, 75, Imperial Continental 91, 91¼. 91½, Malta and Mediterranean 4 3/16, Primitiva preference 73s. 9d, 75s., South Metropolitan 84⅜, ditto debenture 59⅜, 60½. On Tuesday, Gas Light ordinary 79⅜, 80, 80¼, Imperial Continental 91, 91¼, 91⅛, 91⅜, 92, Primitiva preference 75s., 76s. 3d. South Metropolitan 84, San Paulo preference 8½. On Wednesday, Commercial 4 per cent. 73½, 74, ditto 3½ per cent. 68½, ditto debenture 56, Gas Light ordinary 80⅛, 80⅜, Imperial Continental 91½, Oriental 108½, South Metropolitan, 84½, San Paulo preference 8⅝, Tottenham "A" 119¾, 120. On Thursday, Barnet "D" 102, 103, Brighton and Hove Original 167, 167½, ditto ordinary 122½, Commercial 3½ per cent. 68¼, ditto debenture 56, Gas Light ordinary 79½, 79⅜, 80, 80⅜, 80½, ditto maximum 60⅜, Imperial Continental 91½, Liverpool 88, Malta and Mediterranean 4 1/16, 4¼, Oriental 109, Ottoman preference 3⅜, 3½, Primitiva preference 76s., ditto (1911), 62½, 63, South Metropolitan 83½, 84, 84¼. On Friday, Gas Light ordinary 79½, 79⅜, ditto maximum 60½, 61, ditto preference 74⅜, Imperial Continental 91, Primitiva 47s. 6d., ditto preference 73s. 9d., 75s., 75s. 7½d., South Metropolitan 84, 84⅛, 84¼, South Suburban 80⅜, 81, Swindon 89, 89½.

The Bank rate is 6 per cent.—as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4	Aldershot 4 p.c. Pref. .	..	65—70	..
1,551,868	,,	April 8	5½	5½	Alliance & Dublin Ord.	59—64	62—64*	..
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	62—65	..
280,000	5	April 29	7½	3/-	Bombay, Ltd. . . .	5¼—6⅜	5—5½	..
60,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c. . . B 7 p.c. . Pref. 6 p.c. 4 p.c. Deb.	29—30	25—27	..
338,110	10	,,	7	7/-		15—15½	11—11½	..
115,000	10	,,	6	6/-		13½—14	9½—10	..
157,740	—	—	—	4		..	73—75	..
992,045	Stk.	Feb. 26	†14	55/-	Brentford A Consold. .	261—266	86—88	..
734,910	,,	,,	†11	53/9	Do. B New . .	204—209	83—85	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref. .	109—111	85—90	..
221,400	,,	June 11	4	4	Do. 4 p.c. Deb. .	91—93	..	..
217,880	Stk.	Feb. 26	12	10½	Brighton & Hove Orig.	208—213	1⅝—168	166½—167½
244,200	,,	,,	8	7½	Do. A Ord. Stk. .	154—159	121—124	12.—122½
630,000	20	Mar. 26	12½	22/6	British	44—45	34—35*	..
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	71—73	68
345,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	60—65	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	1½—1⅞	2⁷/-
100,000	10	—	—	4/6	Do. 4½ p.c. Pref. .	4—6	4½—5	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	60—65	..
157,150	Stk.	Feb. 26	6	5	Chester 5 p.c. Ord. . .	108—110	87½—88½	..
1,513,280	Stk.	Feb. 12	5 9/4	49/4	Commercial 4 p.c. Stk.	105—108	72—74	73½—74
560,000	,,	,,	6½	46/8	Do. 3½ p.c. do. .	103—105	68—70	68½
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	55—57	56
800 000	Stk.	,,	4	—	Continental Union, Ltd.	76—79	36—38	..
200 000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—57	..
278,400	—	—	—	11½	Croydon B and C 7 p.c.	..	175—185	..
—	—	—	—	—	Do. E	..	..	..
492,270	Stk.	—	6	5⅔	Derby Con. Stk. . . .	128—135	100—105	..
55,000	,,	—	4	4	Do. Deb. Stk. .	102—104	80—83	..
1,002,180	10	July 29	10	7/6	European, Ltd. . . .	17½—18	12½—13½	..
16,313,480	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord. . . 3½ p.c. max. . 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds .	93—102	79½ 80½	79½—80½
2,600,000	,,	,,	3½	3½		76—79	59—61½	60¼—61
4,062,285	,,	,,	4	4		96—99	73—75	74½—75
4,674,850	,,	June 11	3	3		72½—74½	59—61	..
130,000	,,	,,	10	10		..	..	..
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	78—83	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16½	8—9	..
86,600	—	—	—	9½	Hornsey 7 p.c. . . .	..	125—135	..
131,000	Stk.	Mar. 12	7½	7½	Ilford A and C . . .	151—154	112—117	..
65,780	,,	,,	6⅜	5⅞	Do. B	115—119	103—108	..
65,500	,,	June 26	4	4	Do. 4 p.c. Deb. . .	92—94	73—76	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental .	150—160	90 95	91—92
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	65—67	..
235,242	Stk.	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c. .	119—121	87—92	..
2,498,905	Stk.	Feb. 26	10	5	Liverpool 5 p.c. Ord. { A B	211—213 146—148	87—88	88
806,088	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	78½—79½	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4⅝	4—4½	4 1/16—4½
250,000	100	April 1	4½	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	91—99	..
541,920	20	May 28	4	6/-	Monte Video, Ltd. . .	11½—12	8½—9½	..
1,875,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	80½—81½	..
539,705	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	82—83	75—77	..
55,940	10	Feb. 26	7/14/0	7/8½	North Middlesex 7 p.c.	14—15	10½—11½	..
800,000	Stk.	May 14	8	8	Oriental, Ltd. . . .	117—122	108—110	108½—109
80,000	5	Mar. 26	10	1/-	Ottoman, Ltd. . . .	7½—7⅝	2—3	..
80,000	50	Feb. 26	13	60/-	Portsea, Island B . .	128—131	92—97	..
100,000	50	,,	12	55/-	Do. C . .	118—121	92—97	..
52,000	50	,,	10	—	Do. D . .	..	..	..
249,980	5	April 29	8	—	Primitiva Ord. . . .	5¼—6	2½—2⅝	47/6
499,960	5	June 26	5	2/6	,, 5 p.c. Pref. .	6⅜—7	3½—4	73.9—76/3
521,600	100	June 2	4	4	,, 4 p.c. Deb. .	91—93	80—82	..
—	—	—	—	4	,, ,, ,, 1911	..	..	62½—63
846,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	60—65	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10½—11	8—8½*	8½—8⅝
125,000	50	July 1	5	5		47—49	43—45	..
186,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	188—192	..
209,984	,,	,,	10	10	Do. B	222—224	188—192	..
623,500	,,	,,	10	10	Do. C	220—222	188—192	..
90,000	10	May 28	9	10/-	South African . . .	10½—11½	..	..
6,609,895	Stk.	Feb. 10	6/4/0	44/-	South Met., 4 p.c. Ord.	111—113	83—85	83½—84⅜
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	73½—74½	59—61	59⅜—60½
224,820	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	152—154	..
952,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 6 p.c.	114—116	80—82	80¾—81
60,000	,,	,,	5	5	Do. 5 p.c. Pref. .	110—112	79—81	..
135,000	—	—	—	48/4	Do. West Kent. . .	..	..	..
187,558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	115—118	90—92	..
647,740	Stk.	May 14	5	5	Southampton Ord. . .	99—102	90—95	..
120,000	Stk.	Feb. 12	7½	7½	Tottenham District { A 5 p.c. . B 3½ p.c. . 4 p.c. Deb.	135—138	120—123	119⅞—120
782,275	,,	,,	6	5⅝		115—117	90—92	..
181,255	,,	June 26	4	4		87—89	73—75	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	98—95	60—65	..
226,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	108½—109½	93½—94½	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8⅝	78/9	Wandsworth A 5 p.c.	151—156	117—122	..
255,636	,,	,,	6¾	63/9	,, B 3½ p.c.	129—134	101—103	..
108,075	,,	,,	5/17/8	55/1½	,, C 3½ p.c.	110—115	88—93	..
352,000	,,	,,	6¾	57/6	Wimbledon 5 p.c. .	117—122	93—98	..
98,000	,,	,,	6⅝	63/9	Epsom 5 p.c. . . .	121—126	98—103	..
88,416	,,	June 26	5	5	8 p.c. Deb. Stk. . .	66—69	53—56	..

* Ex. Div. † Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

Lincoln Corporation Gas Accounts.

The abstract of accounts of the Lincoln Corporation for the year ended March 31 shows that the coal used for the manufacture of gas, including carriage, unloading, and all expenses of depositing on the works, cost £26,187; purifying materials and wages, £611; and wages (carbonizing), £3867. By sale of gas to private consumers, the sum realized was £29,925; and from power consumers, £1125. Less uncollectable (£101) and discount (£266), the net amount was £30,681. The total quantity of gas sold was 350,657,836 cubic feet. In the balance sheet it is shown that there was a balance of assets over liabilities of £143,439. The Manager (Mr. W. H. Mainwaring), in his report, states that the manufacture of gas shows a decrease of nearly 18,000,000 cubic feet, which, added to the drop of 10,000,000 cubic feet in the previous year, indicates the effect of the war on gas consumption. This is entirely due to the practical abolition of street lighting, as the sale for general purposes has increased by 7,000,000 cubic feet, notwithstanding the severe lighting restrictions and the earlier hours of closing in the city. The improved private consumption is attributed to the increased use of gas for heating, cooking, and manufacturing purposes; and much of this business should be retained in future years. The report alludes to the cost of production, and observes that the price of coal has increased by more than 40 per cent., but many other items are over 100 per cent. dearer than in pre-war times.

Gas Prices in South Wales.—It has been decided by the Pontypridd Urban District Council, in view of the enormous advance in coal prices, to increase the charge for gas from 3s. 6d. to 3s. 10d. per 1000 cubic feet. Similarly, the Barry Gas and Water Committee are recommending the Council to raise the price of gas from 2s. 11d. to 3s. 4d. per 1000 cubic feet.

Bexhill Water and Gas Company.—At the half-yearly meeting of the Company last Wednesday, the Directors reported that the accounts showed a balance at the credit of the profit and loss account available for dividend of £7785. They recommended that a dividend be paid for the six months ended June 30 at the rate of 6½ per cent. per annum on the capital authorized by the Acts of 1885 and 1892, at the rate of £4 11s. per cent. per annum on the capital authorized by the Act of 1896, Order of 1901, and Act of 1904, and at the rate of 5 per cent. per annum on the preference shares—all less income-tax. This, with provision for income-tax, would absorb £3920, leaving £3865 to be carried forward. The gross revenue, £14,450, was satisfactory, showing an increase of £943, equal to 7 per cent., as compared with the corresponding half of 1915. The revenue expenditure on the manufacture of gas had, however, been exceptionally heavy, due to the abnormal cost of coal and stores. To meet these increased charges, and also the special war expenses, the price of gas had been further raised as from the Midsummer quarter. The yield of water from the several sources had continued satisfactory.

Explosion at the Clayton West Gas-Works.—While measures were being taken to cut off the supply of gas at the works, an employee introduced a light where a valve was being uncovered. An explosion occurred, by which Mr. A. F. Goodson (the owner) and a special constable were seriously burned.

Mr. G. Oliver, for many years a familiar figure at Messrs. Falk, Stadelmann, and Co., Limited, Farringdon Road, E.C., has lost his life by drowning. He was a corporal of the City of London Volunteers; and while on duty with his platoon he missed his footing and fell into a dock.

"Fletcher" gas-heated domestic labour-saving appliances form the subject of a booklet received from Messrs. Fletcher, Russell, and Co., Limited, of Warrington. It deals with the firm's many series of cookers, hot-plates, toasters and grillers, water-heaters, and other of their well-known appliances for domestic and workshop use.

The Spenborough District Council have approved an advance by the Gas Committee in the price of coke to 23s. 4d. per ton. The Harrogate Gas Company have also raised the price; the new charges being 20s. per ton for ordinary coke, 23s. 4d. for broken coke, and 11s. 8d. for riddled coke breeze—delivery in all cases being charged extra.

The Brighouse Gas Committee, with the approval of the Town Council, have appointed a deputation to have an interview with the Ministry of Munitions, in an effort to persuade that authority as to the necessity for the erection of a coal-store at the Mill Lane works at Brighouse, sanction for which has up to the present been refused by the Ministry.

His Majesty's Trade Commissioner in New Zealand (Mr. R. W. Dalton) reports that the Wellington branch of an Australian firm of manufacturers' agents desires to represent United Kingdom manufacturers of (among other goods) gas-mantles. Makers may obtain the name and address of the firm referred to on application to the Commercial Intelligence Branch of the Board of Trade, No. 73, Basinghall Street, E.C. In making application, the reference number (315) should be quoted.

The gas-fires, cookers, heaters, &c., of Messrs. Arden Hill and Co., of Birmingham, are described and illustrated in their new season's catalogue and folders, copies of which are now available. In addition to their own "Hygeia" ventilating gas-grate—an attractive model, designed to "change the air of the apartment as efficiently as the coal-grate whose place it takes—the firm have, under licence from Messrs. John Wright and Co., embodied the "injector-ventilating" principle in nearly all their patterns. All their fires have their patent silent gas-fire burner. A feature of the catalogue is a useful "gas-fire indicator," to enable one to ascertain the correct size of fire for rooms of different capacities.

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CHEMIST (BENZOL PLANT). No 6223.
ERECTOR AND REPAIRER, &c. Desborough Gas Works.
STOKERS. Dover Gas Company.
SULPHATE MAKER. No. 6225.

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CLERK. No. 6226.

Plant, &c. (Second-Hand), Wanted.

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Plant, &c. (Second Hand), for Sale.

AMMONIA LIQUOR STILL. Consett Iron Company.
GAS DRIVEN ELECTRICAL GENERATING PLANT. Cory Bros., Cardiff.
METERS. No. 6221.

Gas Examination Courses.

Mr. Cranfield, Nuneaton.

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